DOCUMENT RESUME

ED 127 169 SE 021 206

AUTHOR Page, Laura M.; Reed, Elizabeth W.

TITLE Watching and Wondering: MINNEMAST Coordinated Mathematics - Science Series, Unit 1.

INSTITUTION Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
SPONS AGENCY National Science Foundation, Washington, D.C.
PUB DATE 71
NOTE 136p.; For related documents, see SE021201-234
AVAILABLE FROM MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS PRICE MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS *Curriculum Guides; Elementary Education; *Elementary School Mathematics; *Elementary School Science; Environment; Experimental Curriculum; *Interdisciplinary Approach; Learning Activities; Mathematics Education; Primary Grades; Process Education; Science Education; *Units of Study (Subject Fields)
IDENTIFIERS *MINNEMAST; *Minnesota Mathematics and Science Teaching Project

ABSTRACT

This volume is the first in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of six groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The emphasis in this unit is on observing objects and phenomena with which the child is somewhat familiar. The six activity groups are entitled: (1) Exploring the classroom, (2) Exploring the school building, (3) Exploring outdoor areas, (4) I wonder, (5) Weather, and (6) Day and night. Reading lists for both students and teacher are provided as is a set of masters for a take-home booklet. (SD)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

MINNEMAST

WATCHING & WONDERING

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ED127169

SE 021 206

2

MINNESOTA MATHEMATICS AND SCIENCE TEACHING PROJECT

MINNEMAST COORDINATED MATHEMATICS–SCIENCE SERIES

KINDERGARTEN

1. WATCHING AND WONDERING
2. CURVES AND SHAPES
3. DESCRIBING AND CLASSIFYING
4. USING OUR SENSES
5. INTRODUCING MEASUREMENT
6. NUMERATION
7. INTRODUCING SYMMETRY

FIRST GRADE

8. OBSERVING PROPERTIES
9. NUMBERS AND COUNTING
10. DESCRIBING LOCATIONS
11. INTRODUCING ADDITION AND SUBTRACTION
12. MEASUREMENT WITH REFERENCE UNITS
13. INTERPRETATIONS OF ADDITION AND SUBTRACTION
14. EXPLORING SYMMETRICAL PATTERNS

SECOND GRADE

15. INVESTIGATING SYSTEMS
16. NUMBERS AND MEASURING
17. INTRODUCING MULTIPLICATION AND DIVISION
18. SCALING AND REPRESENTATION
19. COMPARING CHANGES
20. USING LARGER NUMBERS
21. ANGLES AND SPACE
22. PARTS AND PIECES

THIRD GRADE

23. CONDITIONS AFFECTING LIFE
24. CHANGE AND CALCULATIONS
25. MULTIPLICATION AND MOTION
26. WHAT ARE THINGS MADE OF?
27. NUMBERS AND THEIR PROPERTIES
28. MAPPING THE GLOBE
29. NATURAL SYSTEMS

OTHER MINNEMAST PUBLICATIONS

The 29 coordinated units and several other publications are available from MINNEMAST on order. Other publications include:

STUDENT MANUALS for Grades 1, 2 and 3, and printed TEACHING AIDS for Kindergarten and Grade 1.

LIVING THINGS IN FIELD AND CLASSROOM
(MINNEMAST Handbook for all grades)

ADVENTURES IN SCIENCE AND MATH
(Historical stories for teacher or student)

QUESTIONS AND ANSWERS ABOUT MINNEMAST
Sent free with price list on request

OVERVIEW
(Description of content of each publication)

MINNEMAST RECOMMENDATIONS FOR SCIENCE AND MATH IN THE INTERMEDIATE GRADES
(Suggestions for programs to succeed the MINNEMAST Curriculum in Grades 4, 5 and 6)

WATCHING & WONDERING

MINNEMAST COORDINATED MATHEMATICS - SCIENCE SERIES

UNIT 1

MINNESOTA MATHEMATICS AND SCIENCE TEACHING PROJECT

The Minnesota Mathematics and Science Teaching Project

developed these materials under a grant from the

National Science Foundation

FOURTH PRINTING
1971

Except for the rights to materials reserved by others, the publisher and copyright owner hereby grants permission to domestic persons of the United States and Canada for use of this work without charge in English language publications in the United States and Canada after July 1, 1973, provided the publications incorporating materials covered by these copyrights contain acknowledgement of them and a statement that the publication is endorsed neither by the copyright owner nor the National Science Foundation. For conditions of use and permission to use materials contained herein for foreign publications or publications in other than the English language, application must be made to: Office of the University Attorney, University of Minnesota, Minneapolis, Minnesota 55455.

Any opinions, findings, conclusions or recommendations expressed herein do not necessarily reflect the views of the National Science Foundation or the copyright holder.

© 1967, University of Minnesota. All rights reserved.

MINNESOTA MATHEMATICS AND SCIENCE TEACHING PROJECT

Director

DR. JAMES H. WERNTZ, JR
Associate Professor of Physics
University of Minnesota

This version of Watching and Wondering was developed by the MINNEMAST staff from earlier editions of MINNEMAST materials in the light of the experience of the many teachers who have tried the materials in the classroom. The current edition, Unit 1 of the MINNEMAST Coordinated Mathematics-Science Series, was produced under the leadership of:

LAURA M. PAGE, M.A.
Kindergarten Consultant

ELIZABETH W. REED, PH. D.
Science Consultant

Supporting Staff

HADASSAH BACANER
Editor

JACK KABAT
Art Director

MINNEMAST
720 Washington Avenue S. E.
Minneapolis, Minnesota
55414

CONTENTS

SUMMARY OF THE UNIT ____ 1

INTRODUCTION ____ 2

MATERIALS LIST ____ 7

LETTER TO THE PARENTS ____ 9

READING LIST ____ 109

SECTION 1 — EXPLORING THE CLASSROOM 10

Telling Others ____ 10

Describing an Object ____ 11

Predicting ____ 12

Mystery Boxes ____ 12

Noticing Changes ____ 13

Looking Once More ____ 13

Story: The Day Watchman ____ 14

SECTION 2 — EXPLORING THE SCHOOL BUILDING 20

Tour of the Building ____ 21

Visit to a Special Room ____ 21

Game: "Where Did You See That? " ____ 22

Story: Ollie and Jay ____ 23

SECTION 3 — EXPLORING OUTDOOR AREAS 30

Exploring the School Yard ____ 31

Exploring a Wooded Area ____ 32

Grassy Areas ____ 33

Bog or Water Areas ____ 34

Kinds of Soil ____ 34

Some Speculations ____ 35

Story: The Bird and the Worm ____ 36

SECTION 4 I WONDER 58

Wondering about Thumbs 59
Wondering about Falling Objects 60
Wondering How Animals Sleep 60
Story: Five Reasons for a Cat 62
Story: The Night Watchman 70

SECTION 5 WEATHER 75

The Wind 76
The Air 76
The Clouds 77
The Rain 78
The Fog 79
Dew and Frost 79
The Snow 79
Weather in Poetry 80
Story: Picnic at the Beach 81

SECTION 6 NIGHT AND DAY 90

Nightwatching 91
Daywatching 92
Shadows 92
Elementary Sun Dial 94
Day and Night in Poetry 94
Story: The Lost Shadows of Twitterville 95

TAKE HOME BOOKLET WONDERING WHY 111

SUMMARY OF THE UNIT

The contents of Watching and Wondering naturally fall into three divisions. In Sections 1-3, the emphasis is on observing objects while exploring the classroom, the school building, the school yard and other outdoor areas. The children are encouraged to give clear descriptions of objects and to ask questions about what they observe. Section 4 gives examples of how to start with questions of interest to the children and lead them to speculate and investigate. "Wondering" and trying to find out are related in activities of this section. Sections 5-6 stress observation of phenomena associated with weather and day and night changes. Suggested activities are to stimulate discovery of patterns and regularities in observed phenomena.

INTRODUCTION

The first unit for kindergarten starts a process of learning through discovery and testing. Here is laid the groundwork for a scientific approach to experience which, it is hoped, will continue throughout each child's active life. At the kindergarten level, the natural curiosity of the child can motivate the learning experience. The child finds that learning is relevant to his own questions — what we call "wonderings". He gains confidence in his own intellectual powers for problem solving. At the same time, the beginning skills of careful observation and reporting are practiced and developed to provide the background for speculation and investigation. The skills developed in this unit are basic to learning in general. The attitudes of observing, questioning, and speculating are fundamental to the study of mathematics and science.

This unit, then, is concerned not with specific content but with an independent approach by the child to learning. The child's observations may not be correct, from the adult point of view. At first he may have difficulty in expressing his observations in language. But the fact that he is learning to watch, to wonder, and to seek his own answers is enough at this level. Each response of the child must receive an acceptance which recognizes the importance of his fledgling attempt. Fanciful irrelevancies may be challenged with the question "Why do you think that?" This suggests to the child that he is expected to speak thoughtfully.

The young child is inclined to use words which express his feeling about an object (like "nice," "good," "bad," etc.) rather than terms which describe it for others. In activities of Watching and Wondering, you can encourage precise descriptions and help the child develop an appropriate vocabulary. Describing and Classifying, Using our Senses and other units will provide additional practice in description.

To encourage original investigation, avoid providing any more information than is necessary for the proper conduct of the lesson. Be alert for questions that are really worth pursuing. Do not push for solutions beyond the comprehension of the children themselves. At times it is well to say, "We will have to think of this some more and do more observing." Leaving some questions unanswered lets the children know that the search for answers is a continuing process.

The first three sections encourage observation and questioning as the children encounter a new environment in which they will spend a number of years — the classroom, school building, and playground. Youngsters should be guided into perceiving the school environment as provocative, filled with objects and stimulating ideas worthy of continuing wonder. In describing and discussing these observations, the children will develop important verbal skills which will enable them to share experiences and information. Exploration of the school environment should continue and expand throughout the year. To reinforce the concept of observation, use the stories, "The Day Watchman" in Section 1 and "Ollie and Jay" in Section 2. In Section 3, the use of "The Bird and The Worm" gives the children an opportunity to predict. In Section 4, the children consciously explore their own wonderings stimulated by wonderings which you suggest. The stories "Five Reasons For A Cat" and "The Night Watchman" belong here. In Sections 5 and 6, natural curiosity about the weather and daytime and nighttime changes motivates wondering about natural phenomena. The story "Picnic at The Beach" is appropriate for Section 5. The story, "The Lost Shadows of Tittersville," which implies a question about the phenomena of sunlight, can be used with Section 6. The art work is arranged so that the teacher can display the appropriate illustration on the left-hand page (by folding it back to face the children) while reading the narrative on the right-hand page.

At the end of the unit you will find a ten page picture book entitled Wondering Why. This booklet can be used as an introduction to the unit and as a source of motivation throughout the year to stimulate observation, speculation (a simple form of hypothesizing), and predicting.

Additional copies of Wondering Why, separately bound, are provided so each child can have his own copy to take home, color and share with his family.

ILLUSTRATIVE LESSON

An actual experience with a group of young children illustrates how watching, wondering and discussing develop in the classroom. Each group of children would respond differently, but the approach would be similar.

In a discussion of things to wonder about, children became interested in the wind and seemed to keep coming back to the question, "Why can't we see the wind?" When the class began thinking about an answer to its own question, these attempts were offered:

"Because it is air."

"Because it is going so fast."

"Maybe it is invisible."

"Wind is really air. When it moves it's wind."

"You can see right through it. Wind is just like glass."

"It is clear."

"You can hear it."

"We can only feel the wind."

Then the teacher posed the question, "How would you go about finding out why we cannot see the wind?" These answers came from the children:

"If you wanted to find out about the wind, you would look in a book."

"Call the weatherman."

"Go outside and think and see if you can find out."

"You could climb a tree and see what the wind is like up there."

"Use a balloon to make an experiment to see if the wind is there."

When we analyze the children's approach to the solution of the problem, we see that the operations stressed in this unit were put to work.

Observations were expressed:

"We can feel the wind."

"We can hear it."

"Wind is just like glass."

"It is clear."

"You can see right through it."

Hypotheses — attempts at explanation — were offered:

"Wind is really air. When it starts moving we call it wind."

Investigations were proposed:

"You can climb a tree and see what the wind is like up there."

"Use a balloon to make an experiment to see if the wind is there."

At this level, the experiences leading to questions, speculation, and predictions are not complicated. An actual example of a child's responses to an observation shows how simple and spontaneous the development may be.

A child goes for a walk. He notices that the sidewalk is lumpy in several places, and wonders why. Looking around, he sees that wherever there is a lump, a big tree is growing alongside the walk. He thinks about this, and decides that the tree is the cause of the lump. He can now predict that, at the next tree, the sidewalk will again be lumpy. His prediction may not be correct for all cases, because in some places the sidewalk by the tree will have been replaced. Wondering why there is no lump where he expected a lump, he notices that the sidewalk is of a different color and smoother, and he concludes that it is new. He now has more knowledge and offers an improved prediction. He thinks that at the next tree, the sidewalk will either be lumpy or new. Even now, his prediction may be faulty, but that is all right. He cannot be expected to know that some trees have shallow roots which affect the sidewalk and that others have much deeper roots and may not. What he will find out is that often many factors are involved in apparently simple problems, and that he will find more and more answers, as well as more and more questions, as he learns to observe with care.

The children in your class will make observations, uniquely their own, and the course of discussion will depend on their relative maturity and previous experience. MINNEMAST is compiling a portfolio of actual discussions of young children arising from observation. We invite you to contribute and share the experiences of your class in wondering and seeking answers.

OBJECTIVES

After completing Watching and Wondering, the child should have developed the habit of observing, asking questions, and looking for patterns and regularity in what is observed. His ability to give descriptions and to participate in discussions should be significantly broadened as the result of experiences provided.

NOTES ON USE OF THE UNIT

You will be the sole judge of how much time to spend on each section and whether to repeat, simplify or expand it. This unit is intended as a general guide for an approach to be followed throughout the school year. Begin Section I early in the fall but do not feel you must do more in the exploration of the school building than your children are ready for. It is not necessary to discuss everything you see on the first trip through the building or outside it. More discussion and focus on wondering can come later in the year when the children in the group are mature enough to benefit from it.

Since the activities of this unit are intended to extend over much of the year, other units should be started and carried on at the same time. Curves and Shapes should be begun as soon as you feel that your children are ready for it, probably within a month of the start of school.

Each section begins with a commentary, explaining the aims and general approach. This is followed by specific directions for classroom procedure. Once you are familiar with the intent of the section, you may wish to follow cues provided by the children in adapting activities to suit your class. The stories included in the unit are to reinforce the child's experiences in observing, questioning and predicting. Feel free to use other suitable stories, such as those on the Reading List. The letter to the parents should be sent home as soon as your class starts the unit. Have the children take home Wondering Why when they begin Section 4.

MINNEMAST HANDBOOK

A MINNEMAST handbook called Living Things in Field and Classroom can be useful to you. It describes in detail what living things you may expect to find when exploring outdoor areas with the children. It has suggestions for setting up displays of animals, plants, rocks and fossils, and tells how to maintain living specimens in the classroom setting. You may wish to encourage children to bring in such objects of interest. They can then observe the objects and ask questions about them. You will find the handbook listed in the Reading List.

Complete List of Materials for Unit I

(Numbers based on class size of 30.)

total number required to teach unit	item	lessons in which item is used
30	** letters to parents	
5	* 4" x 4" x 4" boxes with lids	1
10-20	assorted small objects, e.g., jacks, coins, buttons, crayons	1,4
8	* containers for living specimens	3
30	* plastic bags and rubber bands or *twistems	3
30	* magnifying glasses	3
1	piece of oak tag, about 24" x 28"	3
1	aquarium or substitute	3
1	bag of sand	3
1	toy sieve or tea strainer	3
4-5	objects which can be airborne, e.g., *feather, *balloon, paper airplane, *cotton	4
1	ball, about 4" in diameter	4
1	cotton, roll	4
1	electric fan, fully enclosed or with rubber blades	5
3-5	strips of paper or cloth for streamers	5
1	* roll of tape and paste	5
1	* balloon	5
1	styrofoam ball, about 3" in diameter	5
1	piece of cardboard	5
30	pieces of blue and gray paper	5
	chalk in different colors	5,6
	poems or songs about wind, rain, clouds, day and night, stars, moon	5,6

1	display calendar, about 24" x 28"	5
	cutouts of sun, clouds, etc.	5
1-2	light sources, e.g., flashlight	6
	toys which cast interesting shadows	6
1	box with lid, for peep show	6
1	piece of heavy cardboard, 12" x 12"	6
1	knitting needle or long nail	6
30	**booklets, "Wondering Why"	

*kit items as well as

**printed materials available from
Minnemath Center, 720 Washington Ave. S.E., Mpls., Minn. 55455

UNIVERSITY OF Minnesota

MINNESOTA SCHOOL MATHEMATICS AND SCIENCE CENTER
720 WASHINGTON AVENUE S.E. · MINNEAPOLIS, MINNESOTA 55414

Office of the Director

Dear Parent:

During this school year, your child will participate in an experimental program of learning developed by MINNEMAST, the Minnesota Mathematics and Science Teaching Project. The curriculum introduces science and mathematics fundamentals in a way that is suitable for the very young child.

Teams of educators, teachers, scientists, mathematicians, and psychologists — working together — developed the methods and materials of the program. Schools use the program only with direct supervision of qualified consultants from a neighboring university.

We live in a world that is changing rapidly — more rapidly than ever before in history. This means that we cannot predict accurately what a child will need to know in later life. The aim of MINNEMAST is to prepare the child to solve problems for which there can be no specific instructions now. The MINNEMAST curriculum provides many experiences in observing, describing, measuring and experimenting. In this way, the child develops attitudes and skills which equip him for lifelong learning. We have reason to believe that the child retains what he learns through his own efforts and that he enjoys the process of discovering for himself.

The first unit of the kindergarten year is called Watching and Wondering. It is intended to encourage your child to explore his surroundings and to help him observe many things he may not even have noticed before. From time to time, you are invited to share in his activities. For example, when his class is asked to observe the differences between night and day, we suggest that you take him for an evening stroll and help him make discoveries about nighttime. Your child will tell you of other experiences you can share.

We will inform you occasionally about the experimental materials and the kind of instruction your child is receiving. We hope you will find this information helpful. Your comments and reactions can be valuable to us.

Sincerely yours,

James H. Werntz, Jr.

James H. Werntz, Jr.
Assbciate Professor of Physics
Project Director

SECTION I

EXPLORING THE CLASSROOM

PURPOSE

To encourage the child as early and as often as possible to look at things with a questioning and wondering mind.

COMMENTARY

This section can start informally and tentatively on the first day of school, when you acquaint the children with various facilities of the room. Many items in a kindergarten room excite the interest of the children and may be made the focus for conscious observation by them.

In the beginning you select those features for exploration which need to be understood immediately, such as: lavatory facilities, closet or coat hooks, shelves for mats. Look for and follow the natural interests of the children in choosing objects which stimulate observation and questioning.

From time to time, through innovation, provide new opportunities for interesting and challenging exploration. Whatever the particular object or activity, the success of the lesson depends on an approach which allows the child to make his own observations.

MATERIALS

- 3 or more boxes with lids, approximately 4" x 4" x 4"
- assorted jacks, marbles, coins, buttons, small rubber balls to go in "mystery boxes".

Activity I

Telling Others

After many informal experiences in exploring the room, introduce the word "explorer" and ask what an explorer is and does. Try to elicit from the children that an explorer has to look at things very carefully and to ask many questions in order to find out all that he can and then be able to tell others. If the children do not seem to know what an explorer is, tell them.

Then say, "We can be explorers, too, right in this room. Imagine you are an explorer for your family. When you get home, somebody in your family, or a friend may ask, 'What did you see in your classroom?'"

WHAT CAN YOU TELL HIM?

Then, following the child's lead, you might suggest that his mother (father, friend) would like to know more about the playhouse (or some other area of interest).

WHAT CAN YOU TELL ABOUT IT AFTER YOU LOOK CAREFULLY?

ARE THERE OTHER WAYS OF FINDING OUT ABOUT THE PLAYHOUSE BESIDE LOOKING AT IT? (by using it, feeling of things, lifting furniture, etc.)

The next day, you may want to raise the question again.

DID ANY ONE AT HOME ASK YOU ABOUT OUR ROOM?

WHAT DID YOU TELL HIM (HER)?

DID YOU REMEMBER ABOUT THE PLAYHOUSE?...SCIENCE TABLE?...CLOAKROOM?

Review some of the ideas for exploring mentioned yesterday.

Describing an Object

Activity 2

Choose an object such as the piano and "explore" it. Invite the children to come to a selected object (here the piano). Touch it and say, "I am exploring and I found something. What is it?" Have the children look at it, touch it and ask questions about it.

WHAT COLOR IS IT?

IS IT ROUGH OR SMOOTH?

HOW IS IT DIFFERENT FROM OTHER OBJECTS HERE?

HAVE YOU SEEN SOMETHING LIKE IT SOMEWHERE ELSE?

After several experiences with objects which you have chosen, ask one of the children to select an object to explore. For example, Richard might choose to explore a chair. He says, "I am an explorer and I have found something. What is it?"

You may have to help considerably with questions during the first few explorations. The children should sit on the chair, handle it, turn it over, and consider such questions as: What color is it? What is it made of? What different parts does it have? How many ways can you think of to use a chair? How is it different from other chairs you have sat in?

To increase the children's desire to explore, have some surprise things such as: a new doll in the playhouse, a jumping jack in a box, a bag of peanuts in the cupboard, or a package.

This method may be used in regard to almost any item, area or activity with which the child is involved. By having the child observe, handle, question and analyze even the most familiar things, he learns not to take them for granted, and his powers of observation grow. You can gauge the attention span of your class and will have to decide on the frequency and extent of the explorations.

Activity 3 — Predicting

Each closed door, box, chest or cupboard offers an opportunity for practice in predicting. As children approach such an object, take time before opening it, to ask them to guess what is behind or within. If a child says, "I think there's a book in there, because there are books in the other one," this is an adequate reason. Even though some guesses might be fanciful you should accept them. You are trying here to help the children become active askers, answerers and predictors.

Activity 4 — Mystery Boxes

Several small sealed boxes containing objects such as coins, buttons, marbles or jacks, are kept in the room to be examined by the children from time to time. After a day or two these are to be opened. They should make sufficiently interesting noises so that the children will have some reasons for their guesses about what the boxes contain. For instance, a combination of small rubber balls with metallic objects makes a fascinating sound. The boxes are useful chiefly to arouse curiosity and speculation.

Noticing Changes

Activity 5

Children like to pretend they are detectives. Several times during the year re-arrange part or all of the equipment in the room or add new items. Tell the children that you have changed something in the room.

WHO CAN TELL WHAT IS CHANGED?

This stimulates interest and alerts the children to watch for changes. Sometimes include the children in the re-arranging.

On other occasions, have the children observe objects in a special display you have arranged. Set up areas with displays of objects appropriate to the season or to current activities such as: real flowers, fruits or vegetables. (Try to include items the children may not have seen before; for example, many children have never seen fresh green beans.) Change these displays from time to time.

Looking Once More

Activity 6

Late in the year, challenge the children to look around the room and try to see what they have never noticed before. Explain that there might be some things which have been in the same place since the first day of school and yet have been overlooked by them. (For example, the writing board in the teacher's desk, the flag, the music compartment inside the piano bench, or the thermostat might be new discoveries.)

THE DAY WATCHMAN

22

Linda was playing in a sandbox in the park. Scritch, scratch -- she filled her pail with sand. When it was full, she looked up and saw a little man sitting on a park bench nearby. Linda was surprised by everything about him. He was scarcely larger than a leaf, and he wore an orange and green striped suit with shiny, brass buttons. His hat was trimmed with potato chips, which dangled from the brim. Even more surprising to Linda was the way he would reach up every little while, break off a piece of potato chip, and pop it in his mouth.

Seeing all this, Linda smiled. When the little man smiled back, Linda said, "Hi! Who are you?"

"Me? Oh, I'm a watchman. I come to this park every afternoon and <u>become</u> a watchman. That's what I do." The little man was very proud of himself.

Linda couldn't understand it; it didn't sound like much fun to her--certainly not as much fun as playing in the sand. But she was curious. "Just what do you have to do to become a watchman?" she asked.

"Oh, it's not hard," the little man answered. "You just watch things with your ears and with your hands, as well as with your eyes. I watch everything in this park in these ways, and -- if I do say so myself -- there is very little that I miss around here when I'm playing watchman."

Linda wrinkled up her pretty little face. "How can you watch with your ears or your hands? People can only watch with their eyes."

"Shoosh!" The little man pressed a tiny finger against his mouth. Linda tried to be very quiet. She wondered what was going to happen.

Then she heard, "Tic, tic, tic, tic, snort! Tic, tic, tic, tic, snort!"

"What's that?" she whispered to the little man. "I never heard any sounds like those before."

The little man smiled. "Oh, I think you have," he said, "but you probably weren't really listening very hard before."

Then Linda heard, "Tic, tic, tic, tic, snort!" again. She looked up and saw a dog coming down the walk.

23

"Why it's Dibber -- Tommy's dog!" she shouted. "I know him! He plays with me after school sometimes." Then, turning to the little man, she added, "Dibber made those sounds with his paws and nose, didn't he?"

"Certainly," the little man agreed. "So now you can say that you watched something with your ears. But what about your hands? Is there anything about Dibber that you might find out with your hands?"

Linda laughed. "Of course," she said, and she began to pat Dibber's head. "I can feel the fur on Dibber's back. It's soft and fluffy. And his ear! Just see how this curl at the end of his ear fits around my finger!" Then lifting Dibber's paws gently, one at a time, Linda said, "Look at Dibber's paws -- they're black on the bottom." Next she noticed the pads on Dibber's paws. She poked one pad gently with a finger "Why, this feels hard and tough. I never knew that! I guess I never did look at Dibber very carefully before." The little man's eyes twinkled and the potato chips on his hat jiggled as he bobbed his head up and down in agreement.

Linda rubbed Dibber's ears and touched his nose. His nose felt very cool. Dibber started to lick her fingers, but that tickled. Besides, Dibber's tongue was all wet. "Stop that, Dibber!" she said, "and come along home. I can't wait to tell Tommy all I learned about you."

EXPLORING THE SCHOOL BUILDING

PURPOSE

To encourage the child to extend observing and wondering beyond the classroom.

COMMENTARY

Exploring the school building gives the child an opportunity to expand his area of observation; at the same time it makes him feel at home in his school. If the tours and visits are especially interesting, the child will be filled with information to discuss and think about — not only in school, but also at home. The primary purpose of a tour, from the standpoint of Section 2, is to provide more opportunities for observing and wondering. The first visit will be to acquaint the children with the building. Little discussion of details should be tried at this time. Observations that do not emerge during the tour may be recalled in the less exciting atmosphere of the classroom. Several visits should be planned to various areas, with emphasis on the special features of each.

PROCEDURE

You and the children plan together for a tour of the halls or for a visit to a special room. You may alert them in advance to some things to look for in such special places as the nurse's room or the principal's office. In doing so give only enough information to stimulate interest, leaving much for the group to discover on their own. Some features the children observe will suggest questions for investigation: for example, how are the bulletin board surfaces different from the surface of other walls, how do you tell that the radiators are working (by the heat given off and by the hissing), how are the doors in the entrance way different (they are wider, heavier), how do you know where to find the fountain or staircase on each floor (they are in the same place as on other floors).

If on the first trip the children are overwhelmed by the strangeness of the new surroundings, detailed exploration may be postponed until a second or third trip.

At the conclusion of any visit, encourage the children to talk about all they have seen and done, and to bring up questions.

Tour of the Building

Activity 1

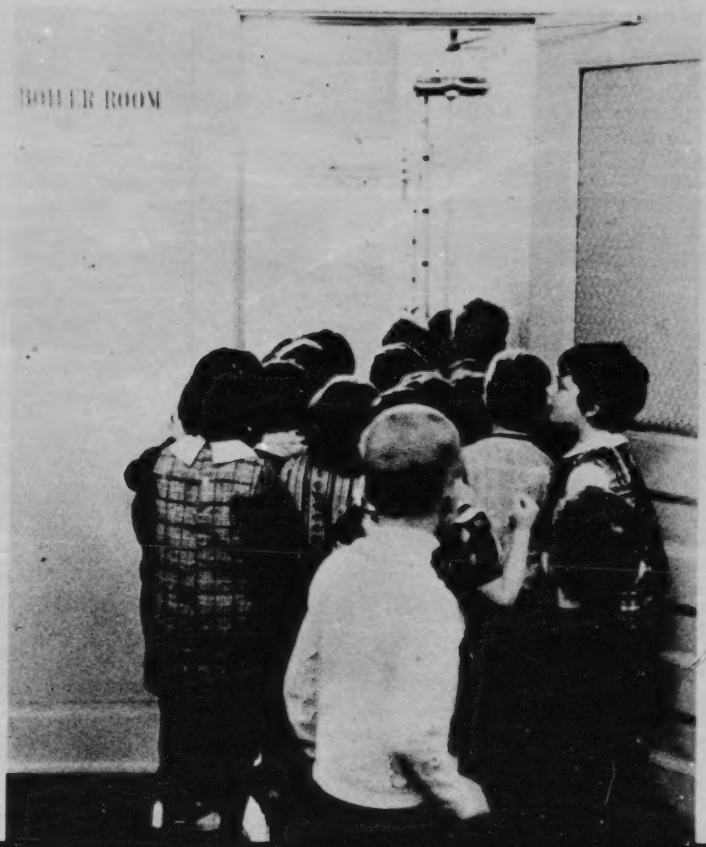
Before leaving the room, take time to discuss etiquette for the visit. The children should think how they will introduce themselves, how they as visitors should act, what should be said on leaving, and by whom, and why.

When the children have discussed their behavior for the tour, and understand the reasons for the rules, lead the way, following the route you have planned. On a tour of the building, stop to examine stairs, drinking fountains, fire extinguishers, fire hoses, pictures, etc. Whenever the children find something interesting to them, take time to stop and let them observe. Stimulate analytical thought by asking, "Why is this here? .... How does this work?"

Visit to a Special Room

Activity 2

A variety of facilities offers opportunities for several trips. A nurse's office, for instance, is an interesting place. The children should be allowed to explore by themselves first and try to learn who the nurse is and what she does. Then, if she cares to augment this information or point out features the children have missed, encourage her to do so. This same procedure is appropriate in each new place.



The children's interests will vary. In the office, some children will be interested in the typewriters, others in the telephones and still others in the fact there are no boys and girls. A visit to the offices provides a good opportunity for the children to meet the principal and the office workers in a friendly way.

For other visits, some of the following might be considered: the boiler room, the science room, the cooking or sewing rooms, the auditorium, gymnasium or library.

Activity 3 — Game: "Where Did You See That?"

Use this game when the group is ready to participate. Any child may begin. He starts by saying, "On my visit to the nurse's office (science room, or other area) I saw...." putting in whatever items he wishes, until he makes a mistake and is challenged. If he includes something that was not in that area and is successfully challenged, the challenger becomes "it". This may continue as long as the children are interested.

Alternatively, a child could select an item. "I saw a typewriter: where did I see it?" The child who answers correctly may offer the next observation.

OLLIE
and
JAY

A gray and white owl sat on a tree branch. The owl's name was Ollie. Ollie's eyes were wide open and he was looking.

"There isn't anything in this forest that I don't see," Ollie bragged.

"I see all the green trees, all the flowers, the grass, the birds, the sun in the morning, the stars at night, and even the children playing in the grass in the afternoon. Why, I see everything!"

A little bird named Jay was sitting on another tree branch. He heard the owl talking to himself.

"Silly owl," he chuckled to Ollie, "do you really think you see everything that goes on in the forest? Did you see that leaf fall from that branch just now?"

"What leaf?" Ollie asked, astonished. "No, I didn't see that!"

"And did you see those seeds fly off that dandelion when the wind blew?" Jay asked Ollie.

"No!" Ollie shouted, with a puzzled look on his face. "I must have missed that, too! Perhaps I'm not seeing a lot of things I should be seeing."

Then Jay shook his blue head and winked his eye at Ollie.

"I wonder if you even noticed that pretty ribbon in that little girl's hair when she walked by? "

Ollie looked down at the little girl. He opened his eyes very wide. "No, I didn't! I didn't even see that little girl. I thought I saw everything that happens in this forest. "

Then Jay spotted a round brown mouse in the grass. He saw the mouse dash into his mouse hole.

"Did you see that mouse, Ollie? "

"What mouse? Where? " Ollie looked all around and twisted his head from one side to the other.

"Oh, dear! " Ollie cried. "I didn't see that mouse at all. And I was so hungry too. "

"You're not looking carefully enough Ollie," Jay said. "You had better pay attention to what you're looking at and then you will see what's really going on in the forest."

Then Jay flew away, leaving Ollie alone.

Ollie watched everything very carefully. He was sure that he wasn't going to miss a thing that was happening in the forest. Suddenly, Ollie twitched his beak. He glanced down and saw a large, fat green caterpillar crawling across his beak.

"Oh, my," he gasped. "How long have you been sitting there? I never did see you!"

EXPLORING OUTDOOR AREAS

PURPOSE

To extend the child's scope of watching and wondering beyond the school building.

COMMENTARY

Exploration of the school grounds and other outdoor areas gives the child still more opportunity to observe carefully objects in his surroundings. It is true that the child has been seeing trees, sidewalks, insects and birds for a long time, but not in an analytical way. This lesson should be conducted in the fall if possible, postponed until spring if necessary, or preferably repeated at suitable times throughout the year. It will be helpful for you to take aides or parent helpers along on the trips. They will need to be given some instructions on what the purpose of the trip is, and some techniques and methods for achieving it.

You will have to choose the areas to explore since regional differences are great. Interesting sites are: wooded areas, shaded places, lawns, rocky areas, and if possible, a place that contains old pieces of lumber, leaves, etc. You will not cover all these areas on one trip. If your school does not have such areas within reasonable walking distance and if you cannot transport classes to parks or other sites, then use areas around the building or on the playground for exploration. The children show interest in new and unusual objects, but there is also excitment in discovering new information about familiar places and things. They may not realize that cracks in the pavement, crumbling masonry or areas around water sources often disclose living specimens.

Before you start out, consult the MINNEMAST handbook, Living Things in Field and Classroom. (See Reading List, page 110.) This handbook tells what you might expect to find in particular outdoor settings. The handbook also explains how to care for living specimens which are brought back to display in the school.

MATERIALS

- containers with lids for living specimens, 8 oz. or larger
- plastic bags, at least 6" x 12", and rubber bands or twisters
- magnifying glasses
- oaktag, 24" x 28", for mounting
- aquarium or other glass container for aquarium
- toy sieve or tea strainer and sand

PROCEDURE

Pre-select the areas you wish the children to see. The areas should be as diverse and interesting as possible, since one of the purposes is to evoke questions. While visiting an area, the children should discuss what they see, what they can deduce from what they see, and how the particular area differs from others. Encourage the children to wonder about what they see. Some very original ideas will be expressed.

Take along plastic bags and fasteners and a couple of jars for wet specimens so the children may collect objects which interest them. The objects brought back to the classroom will help the children to recall what they saw and may stimulate discussion.

Some area in the room should be set aside for display of objects collected on trips. Many observations and wonderings originate there. Early in the school year, because of the short attention span of the kindergarten children, not much mounting and classifying by the children can be expected. By spring these activities following a trip will be very worthwhile.

Exploring the Schoolyard

Activity 1

When on the playground, ask the children to examine the outside of the building. Call attention to the size.

HOW IS IT THE SAME AS YOUR HOUSE?

HOW IS IT DIFFERENT?

WHY?

Observe the external features such as:

the downspouts

window arrangements, size and shape

color and material of walls

location of doors.

Discuss the function of each of these features and wonder why they are where they are.

Observe the schoolyard:

WHAT DIFFERENT MATERIALS COVER THE GROUND? (concrete, black top, crushed rocks, grass, etc.)

ARE THERE PLANTS AND ANIMALS IN THE CRACKS OF THE PAVEMENT? ...AROUND THE FOUNDATION OF THE BUILDING? ...SOMEPLACE ELSE ON THE SCHOOL YARD?

HOW DID THE PLANT GET THERE?

HOW CAN IT GROW HERE?

Ask similar questions about any animals you find. Collect some of these plants and animals in plastic bags to take back to the classroom.

Activity 2 — Exploring a Wooded Area

Children can have many interesting experiences in a wooded area. It may be that because trees are fairly common, we take them for granted. In this lesson try to broaden interest and arouse curiosity by exposing the children to new information. For example a rotting log has many potentials: the moss on the outside, larvae and beetles in the wood, and plants and animals which live under it.

Discuss with the children where you are going on your walk (a wooded area not too far from the school). It will probably be a familiar place to both you and the

children. If it is a private area, you will need to get permission to go there before you take the children. Discuss in advance their behavior. If the children can, have them suggest some things which they think that they may see. Keep a record of their ideas to check when you return. Add some ideas such as "Will all the trees look alike?" and "Why do you suppose that people like to have trees in their yards?" Help the group be observant of things as they walk along.

When you arrive at the wooded area, encourage the children to explore as much as possible. After a few minutes, call the group together and have them tell you some of the things which they have seen. Then ask them questions such as:

DO THE TREES LOOK ALIKE?

ARE THEY THE SAME SIZE?

WHAT ABOUT THE SHAPES AND SIZES OF THE LEAVES?
...THE COLOR AND TEXTURE OF THE BARK?

WHAT ARE TREES USED FOR?

Sit under a tree; then move into the sun.

WHERE IS IT MORE COMFORTABLE?

Grassy Areas

Activity 3

Refer to the directions given for Activity 2 in preparing for the trip.

DO YOU SEE SOME PLACES WHERE GRASS GROWS BETTER THAN IT DOES IN OTHERS? ...WHY?

Have the children roll or walk barefoot on the grass.

HOW DOES THE GRASS FEEL?

HOW CAN YOU TELL GRASS FROM OTHER PLANTS?
(long slender leaves)

Notice some unusual properties of such plants as: dandelions, burdock, milkweed, nettles, vines.

Have children guess what might be under a stone, pile of weeds, or a vine patch. Then explore underneath to find out. Put samples of seeds, weeds or other interesting plants into plastic bags to take back to the classroom. If the children find caterpillars, grasshoppers, ladybugs or other small animals, put them in plastic bags using rubber bands or twisters to fasten the top. (To transport delicate specimens inflate the plastic bags as you would a balloon and fasten the tops.) Take these collections back to the classroom to use in your display area and for further observations and discussion.

Activity 4 — Bog or Water Areas

If your school is fortunate enough to have a stream or a marsh nearby, there are numerous observations to be made. Notice the difference between the movement of the water in the stream and water in the marsh by watching floating objects. Guess and test the following:

WHAT THINGS FLOAT?

WHAT THINGS SINK?

ARE THERE LIVING THINGS IN THE WATER? ....
ON THE SURFACE?

Fill a plastic bag with marsh water to take back to the classroom. On your return, put the water in a glass container or aquarium for viewing. (If there is no water area near the school, you might bring in a pail of pond water.) There will be an amazing number of living things in it. First look with the naked eye and then use a magnifying glass.

Activity 5 — Kinds of Soil

Observe the kinds of soil in different areas. Have the children feel the different textures. Take back samples to the classroom for further study. Have some children stir soil into a glass of water and hold it in front of a light source so they can observe the settling process.

DOES SOME MATERIAL REMAIN ON THE SURFACE?

WHAT IS IT? (plant or animal remains)

Test some sand from the sand box or aquarium in a similar way. Compare a dry soil sample with sand under a magnifying glass and have the children comment on the differences. Have them find out if sieving changes the appearance of the soil sample.

Some Speculations

Activity 6

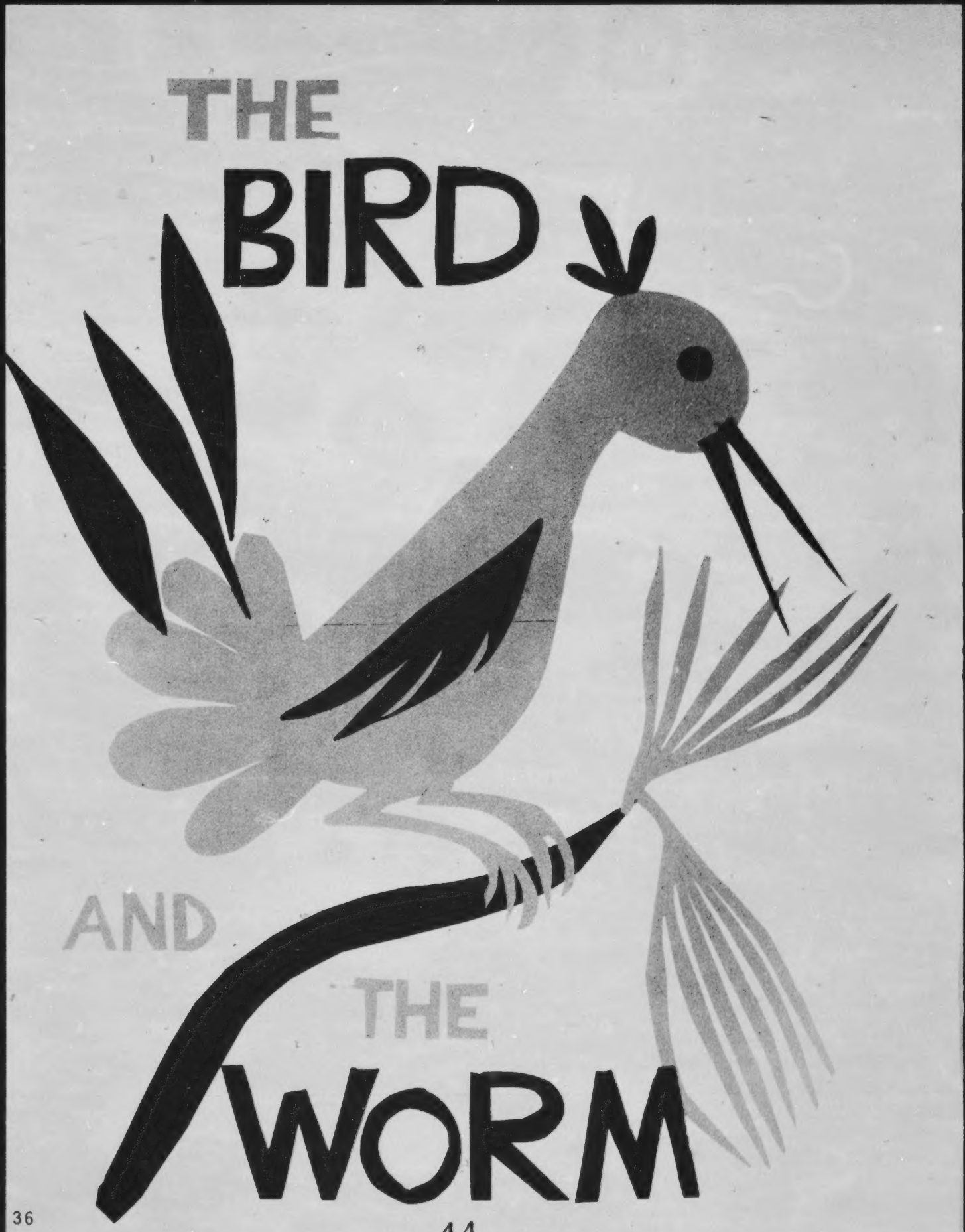
After visits to several areas, children should speculate about some of the following questions:

WHICH AREA WOULD YOU CHOOSE FOR A PICNIC?
.... WHY?

"WHERE WOULD YOU GO TO COLLECT INSECTS?
.... WHY?

WHICH AREAS ARE MOST INTERESTING?

WHICH AREAS WOULD YOU LIKE TO VISIT AGAIN?
.... WHY?


THE
BIRD
AND
THE
WORM

A hungry bird sat on a pine tree branch. He hopped all over the branch looking for something to eat. There was nothing good to eat on the branch, so he flew down to the ground.

46

"If only I could find some big berries or some white seeds, they would taste very good right now," he said.

48

He looked in the tall grass and he poked his beak through the tall grass, but he still couldn't find anything to eat.

50

Just then, a little gray worm stuck his head out of a hole in the ground. "Ho, ho," said the little gray worm. "The hungry bird can't find any big berries or white seeds to eat! I will fool that hungry bird and tell him the pretty flower is good to eat."

Use the suggested questions to elicit predictions as you go along.

QUESTION: How do you think the worm will fool the bird?

52

"Oh, hungry bird," he said, "do you see that pretty flower over there? Try that for your lunch."

QUESTION: Do you think the bird will eat the flower?

54

The hungry bird hopped over to the pretty flower and tasted it. "Oh, no," the hungry bird said. "This isn't what I like for lunch at all!"

QUESTION: Do you think the bird liked the taste of the flower?

56

"Well," said the little gray worm, "Why don't you eat that round, black stone over there? That might taste very fine!"

"Oh, no," the hungry bird said. "I definitely cannot eat a round, black stone. I'm quite sure of that!"

58

"Well, then, how about a house?"

QUESTION: Will the bird eat the house?

59

"Or a leaf? Wouldn't that be delicious?" said the little gray worm.

QUESTION: What do you think the bird did eat for his lunch?

61

62

But now the hungry bird looked straight at the little gray worm and said, "You look like you'd be mighty good to eat. Yes, I do believe you'd make a delicious lunch!"

Then he hopped right over towards the little gray worm!

QUESTION: What do you think the worm did then?

64

But the little gray worm popped into his hole so fast you wouldn't believe it! The hungry bird looked down into the little gray worm's house, with one eye, for a long, long, time. But the little gray worm wouldn't come out until he heard the hungry bird flying away. And I wouldn't either, would you?

I WONDER

PURPOSE

To arouse the child's curiosity so that he starts to wonder and speculate.

To have the child communicate what he wonders about to the class.

To encourage the child to discover ways of evolving answers to questions.

COMMENTARY

Wait to introduce the "I Wonder" lesson until the children have gained some verbal facility in reporting observations and are at ease with you and their classmates. Don't expect the discussions of any question to be conclusive or complete. Children should not feel that they have to arrive at a definite conclusion at the time they first consider a question. Indicate to the children that it is acceptable to leave a problem unsolved and return to it later.

Activities in Section 4 are intended merely to suggest how discussion about wondering may be developed. Feel free to start with other queries. However, be sure you present questions which are related to facts which the children can observe for themselves rather than to matters of opinion which cannot be tested.

MATERIALS

- lightweight objects which can be airborne: cotton, feather, balloon, paper airplane, dandelion or milkweed seed.
- ball, approximately 4" diameter
- crayons, jacks, or other small objects to manipulate with fingers

PROCEDURE

As you listen and observe your group, you will hear many bits of conversation which will give you a lead for

introducing this lesson. You may hear a child say, "I wonder if my grandmother will bring me a present when she comes over to my house today?" Or "I wonder what that black thing is on the side of the aquarium?" These are good "wonderings" with which to open this part of the unit.

You may want to stimulate wonderings by providing surprises such as a new piece of equipment, new games or a visiting animal. If a package is brought to the room, there will be many wonderings about its contents. How about placing a jar with an insect inside it in the bookcase or on a shelf where the children go frequently?

Keep the wondering activity light and have fun with it. Use the more formal suggested activities later in the year. From these activities it will be easy to draw out some assumptions and to find ways of testing some of the assumptions.

Wondering about Thumbs

Activity I

Tell a story which explains how you came to wonder about thumbs. For example, you might say: "I saw a squirrel sitting on a branch of a tree on my way to school. He was holding a nut with both his paws while he nibbled on it. I wonder why he didn't hold it with one paw the way we hold an apple." This might lead to a suggestion by a child that hands are different from paws. Encourage the children to observe their hands and say: "Did you notice how different our thumbs are from our other fingers? I wonder if that makes them more useful. How can we find out?"

Provide some small objects such as crayons or jacks for them to pick up, with and without the use of thumbs. Have them try other tasks in the same way: drinking from a cup, using scissors, turning pages, buttoning a coat. Let them make up tasks. After testing, have children try to explain what makes thumbs so helpful (they approach other fingers from across the palm). You might finish by asking if cats, dogs, or other animals can pick things up in the same way as people can. What animals can do so? (monkeys)

Activity 2 — Wondering About Falling Objects

Say to the children: "Can you jump so high you won't come down?" Let them try. Then say, "I wonder, does everything fall down?" After they have named several things — such as balloons — which they think will not fall down, ask them "How can we find out if the objects you have named will not fall?" Provide several objects such as a ball, cotton, feathers, dandelion or milkweed seeds, a balloon and a paper airplane. Have the children test them one at a time. Eventually enough items should be tried so that the children will see that even a sheet of paper eventually comes to rest on the floor.

Although the word "gravity" may come up in the children's discussion, avoid this technical term which is easy to misrepresent and talk in concrete terms about what the child sees for himself.

If someone suggests that real airplanes don't fall down, have the group consider how real airplanes are different from toy ones.

After the children realize that most objects fall down, hold some object in your hand and ask why it does not fall. (You, your hand, something is holding it up.) Put the object on a table. Ask again why it does not fall down. Lead the children to suggest that perhaps there is something which holds up balloons, airplanes and birds. (air)

Activity 3 — Wondering How Animals Sleep

Say to the children: "When I go to bed at night, everything seems very quiet on my street, and I wonder if the birds and rabbits and all the other animals have gone to sleep too. What do you think? Do some stay awake? How can we find out?" Some children may act out the position in which a pet animal sleeps. Others may report observations of animals made outdoors, on a farm or at the zoo. If an animal is present in the classroom—a turtle, a fish, or a hamster, its habits might be observed. Avoid getting into a discussion of bedtime habits of individual children.

This is a lesson in which the parents can be involved. Send a note asking them to take the children outside after

dark to listen and observe the "night life" of the neighborhood. Many animals are active at night, such as mosquitoes, moths, crickets, bats, owls, cats and mice. Some of the children will be able to tell you about the animals which they saw or heard. If there are some willing parents, they might write a report or come to kindergarten to help the child give a report.

Five Reasons

For A Cat

Linda and Jimmy rushed into the house, shouting: "Daddy! Daddy! Mother! Mother! Guess what? Mr. Baker wants to give us a cat! May we take it?"

"Whoa, there!" Daddy said. "Calm down a little, so we can talk about it. Do we really need a cat?"

"Why, certainly," Jimmy said, "everyone needs a cat!"

Daddy looked surprised. Turning to Mother, he asked, "Do we need a cat?"

"I don't know," Mother said. "I've never thought about whether we need a cat or not."

72

"Please think about it right away," Linda said.

Daddy asked. "Do we need another mouth to feed around here?"

"Oh, Daddy, this is just a little cat." Jimmy held his two hands close together to show how little. "She won't eat much."

"We can feed her scraps from the table," Linda said.

"Oh, no." Mother answered. "Cats like special food to eat -- cat food. If we have a cat we must feed her properly."

"Good for you, Mom!" Jimmy said. "Let's go get her!"

"Not so fast, young man," Daddy said, "I haven't heard any reasons why we need a cat. Help me make up my mind. Think of some good reasons."

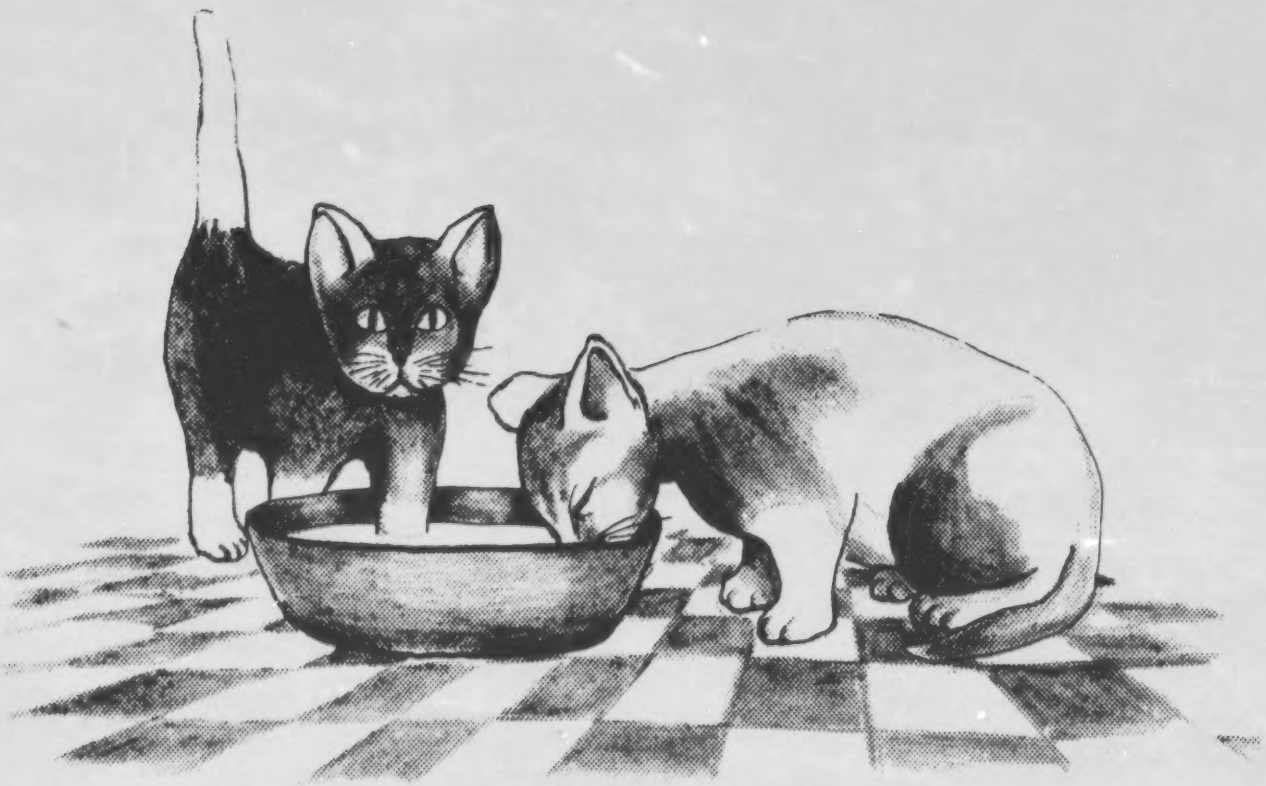
"A cat is a lovely pet," Linda said. "Is that a good reason Daddy?"

"That's an excellent reason," Daddy answered. "In fact, it's such a good reason it makes me wonder why Mr. Baker wants to give away his cat."

Linda explained, "Mr. Baker has five cats, but he doesn't want five cats. He wants to keep only one."

"H'mm," Daddy said, "if one cat is good to have, why aren't five cats a lot better?"

"They are," Linda said, "only Mrs. Baker doesn't think so."



66

"If they are, why don't we take all of them instead of only one?" Daddy made a serious face.

Jimmy was surprised. "Linda and I thought you might not want any cat, Daddy. Now you want a whole bunch of them."

"I didn't say anything about wanting a cat, Jimmy," Daddy reminded him. "The question is whether we need one. You must tell me why we do. Linda thought of one good reason. Now, if you think of four more, I will change my mind."

"Four more reasons! Good grief!" Jimmy wailed. "We'll never get that cat, Linda."

"Don't give up," Mother said. "Try to think of reasons."

Jimmy looked unhappy. "I can think of reasons why Daddy might not want a cat at all. Cat food probably costs a lot of money and somebody would have to take care of a cat."

"Oh, we can afford to buy food for a cat," Daddy said, and Mother nodded in agreement.

76

"And I will take good care of her," Linda promised. "That's no problem."

Then the children thought and thought. "I know!" Jimmy shouted. "A cat could catch mice!"

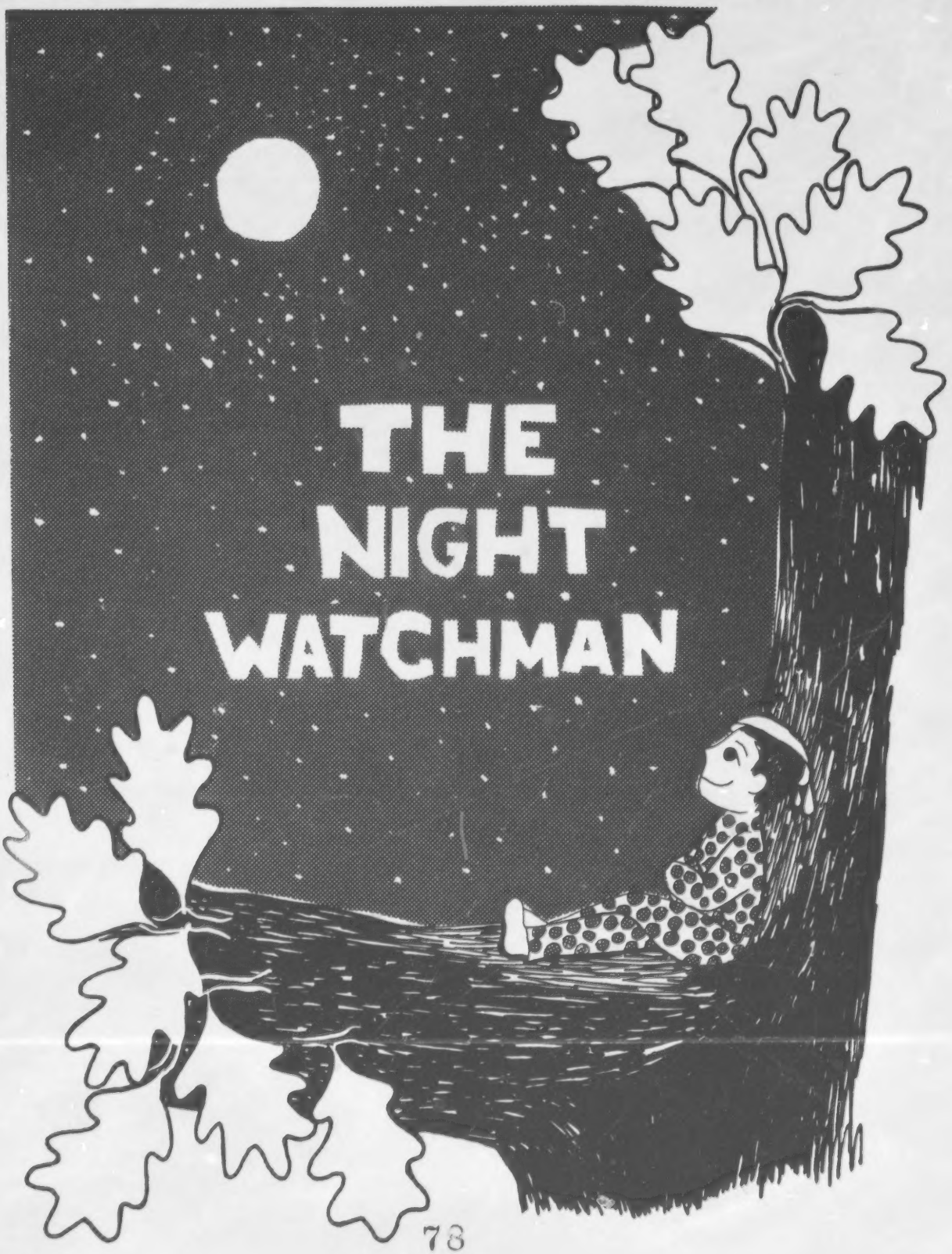
"We don't have any mice," Mother said, "but you never can tell when one might sneak in." She winked.

"Yes!" Jimmy jumped with joy. "A cat would certainly keep the mice away."

"Well, now we have two good reasons," Daddy said. "How about three more?"

"I know, let's ask our friends," said Linda.

And now will you, and you, and you, help Linda and Jimmy think of some reasons so that they may have the cat?



78

One night Jimmy was looking out the bedroom window. The stars were out and the moon was shining bright patches of light on the grass.

Suddenly Jimmy saw a little man sitting in a tree blinking at him. The little man was no larger than a leaf and he wore an orange and green spotted suit. On his head was a little round hat that twinkled when he moved his head. It twinkled because raindrops were hanging from it.

"Hello, out there," Jimmy called. "What are you doing in that tree?"

"I'm watching and wondering," the man said in a squeaky voice.

"Watching and wondering?" Jimmy was amazed. "Why are you doing that when it's bed time? Shouldn't you be in bed?"

"No, I shouldn't. I'm a Night Watchman. It's my job to sit on this branch and watch and wonder," the squeaky voice explained.

Then Jimmy said, "Well, I can see that you're watching, but how do you wonder?"

The tiny man slid down the branch, shook a raindrop from his hat, swallowed it, and said, "Well, it's this way. I watch the stars and the moon. I look at them very carefully. I can't smell them and I can't touch them. I wonder why I can't do these things. I wonder why I can't eat them. I wonder why I can't hear them. Sometimes I wonder why they're so far away. Other times, I wonder why they twinkle. So you see, I have a great deal of wondering to do.

"You know, little man," Jimmy said, "Many times I wonder about the same things myself. Sometimes I wonder about the night and the day. I wonder why it is light during the day and dark at night. Why can't it be light during the night and dark during the day? Did you ever wonder about that?"

"No. I never did. I spend most of my time just wondering about the stars and moon." The little man smiled. "But there are an awful lot of things to wonder about during the day and during the night."

Jimmy couldn't help smiling at all the wondering the little man planned to do. Then he whispered out the window. "I wonder if the wind will blow you off? I wonder why you never sleep?" And Jimmy yawned, closed the window, and hopped into bed.

The tiny man went back to his branch high up in the tree. He sat there watching and wondering the rest of the night.

82

WEATHER

PURPOSE

To use the phenomena of weather to lead the child to make observations, provide description, originate questions and attempt to find answers.

COMMENTARY

Weather is ever present, observation of it is unavoidable, and its causes and manifestations are marvelously complex. Throughout the school year you will have opportunities to direct attention to the changing aspects and the many components of weather. Weather itself cannot be scheduled; therefore, activities of other units should be interspersed among the weather activities.

To make the children alert to weather changes from day to day, you may wish to discuss weather briefly each day over some period of time, keeping a record by drawing or pasting symbols of sun, rain, fog, snow, etc., on a large calendar. After counting is introduced to the children in Numeration, they can count the number of sunny days, rainy days and so on.

MATERIALS

- electric fan fully enclosed or with rubber blades
- strips of paper or cloth for streamers
- gummed tape
- balloon
- styrofoam ball, approximately 3" diameter
- piece of cardboard in fan shape for creating air movement
- 2 light sheets of paper, 9" x 12", in shades of blue and gray
- paste
- chalk of different colors
- poems or songs about wind, rain, clouds, etc.
- display calendar, approximately 24" x 28"
- cutouts to represent sun, rain, snow, etc. for calendar

Activity 1 — The Wind

Take the children outdoors on a day when a brisk breeze is blowing. After the children notice the effects of the wind on themselves (tugging at their clothing, blowing their hair, etc.) ask

CAN YOU SEE THE WIND?

Be sure they understand that one cannot see the wind, only its effects.

WHAT IS THE WIND DOING? (blowing the school flag, smoke, trees, fallen leaves, clouds, dust, etc.)

Have one or more children run with cloth or paper streamers. When he runs with the wind, what happens to the streamers? Can he run fast enough so that the streamers will hang straight down? What happens when he runs against the wind?

The relative effect of differing wind speeds can be noted by observing a tree. The children can observe for themselves that only leaves and small twigs move when a gentle breeze blows, while larger and larger branches move as the wind velocity increases.

Use an electric fan to show both the effect and speed of wind. Attach strips of paper or cloth to the framework of the fan and have the children observe changes in movement at different speeds. If you have a ventilator which forces fresh air into the room, this can be used instead of, or in addition to, the fan.

Activity 2 — The Air

After the experiences of the previous exercise, a question for you to raise, if the children do not, would be:

WHAT IS THE WIND?

The resulting discussion should provide opportunities to introduce simple activities to widen the children's experience with air. For instance, you might do some of the following:

1. Blow up a balloon, noting the effect of the contained air and its outward rush as the stem of the balloon is released. This procedure can be varied by blowing up the balloon to relatively larger and smaller sizes.

2. Fan or blow a styrofoam ball so it moves along a table. Children may observe how fanning and blowing have the same effect. Why?

3. Drop two sheets of paper, one crumpled into a ball, and watch the relative speed of descent. Make sure the children see that the two pieces of paper are of the same material and identical in size before crumpling one. As the children observe that the unfolded paper takes longer to come down, ask what is holding it up.

You may want to leave the children wondering why a breeze is felt through the open window of a moving car even on a still day.

The Clouds

Activity 3

Children enjoy seeing the various forms, colors, and movements of clouds and they enjoy finding familiar shapes in them. Make use of this interest to sharpen the observational abilities of the children. Questions such as

WHAT DO THE CLOUDS REMIND YOU OF?

WHAT COLORS ARE CLOUDS? ...WHEN WOULD YOU SEE PINK CLOUDS?

WHAT DOES THE SKY LOOK LIKE WHEN IT RAINS?

DOES IT ALWAYS RAIN WHEN CLOUDS ARE PRESENT?

Wondering whether it ever rains when clouds are not present, or why it doesn't, can lead to the idea of a necessary condition. The observation may be that the presence of clouds is necessary, but is not the only condition for rain. On a cloudy day, the children might try to guess whether it will rain or not.

The children may enjoy forming cotton into cloud shapes and then pasting their clouds on blue and gray construction paper.

Cotton clouds may be colored with chalk and used to represent weather conditions in their drawings. Some children may learn to identify a few cloud formations, such as cumulus and cirrus. (See Reading List for books on weather.)

Activity 4 The Rain

On a rainy day take the children to a place where they can watch the rain as it falls, feel it on their hands and faces, and listen to it as it splashes against umbrellas and the sidewalk. They should observe the sky and the direction in which the rain is falling. They can report on the wetness and coolness of the rain, the smell of the air and grass during a rain, and the variety of sounds the rain makes when it hits different objects.

The Fog

Activity 5

On a foggy day take the children outdoors to find out if they can feel or touch the fog. (Fog consists of water droplets in the air caused by contact of warm moisture-laden air with a colder ground surface or colder air mass. It is essentially a low cloud.) Have them touch hair, skin, clothing and other objects exposed to the fog. Consider how this weather is like and unlike other types of weather. Raise such questions as

IS IT RAINY WHEN THERE IS FOG?

CAN YOU SEE THE SUN WHEN THERE IS FOG?

Children may associate fog with clouds, morning mist or fogging on windows and glasses. On chilly days they will enjoy making their own fogs by breathing out into the cold air.

Dew and Frost

Activity 6

Dew and frost are two more aspects of weather which may be observed by the children in some areas. (While frost is related to moisture in the air, dew may be partly composed of water exuded by plants and hence its origins are more complex.) The children should note the time of day and what conditions are present when there is dew or frost.

The Snow

Activity 7

The same procedure as that suggested in the lesson on rain applies here. Also collect a pan of snow for later observation so that the children can discover the connection between snow and water, in source (from clouds) and in composition. They should also note the small amount of water which comes from the collected snow. Under certain atmospheric conditions snowflakes will retain their forms on snowsuits long enough to be examined by magnifying glasses, admired and enjoyed.

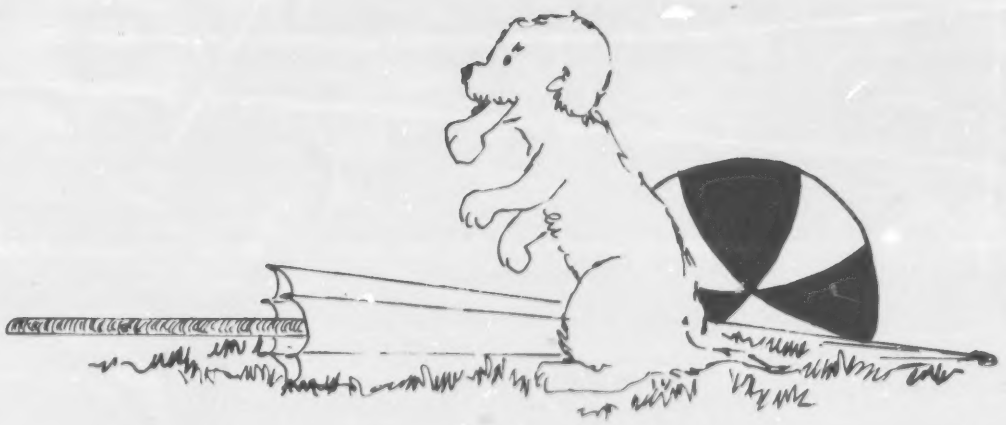
Activity 8 Weather in Poetry

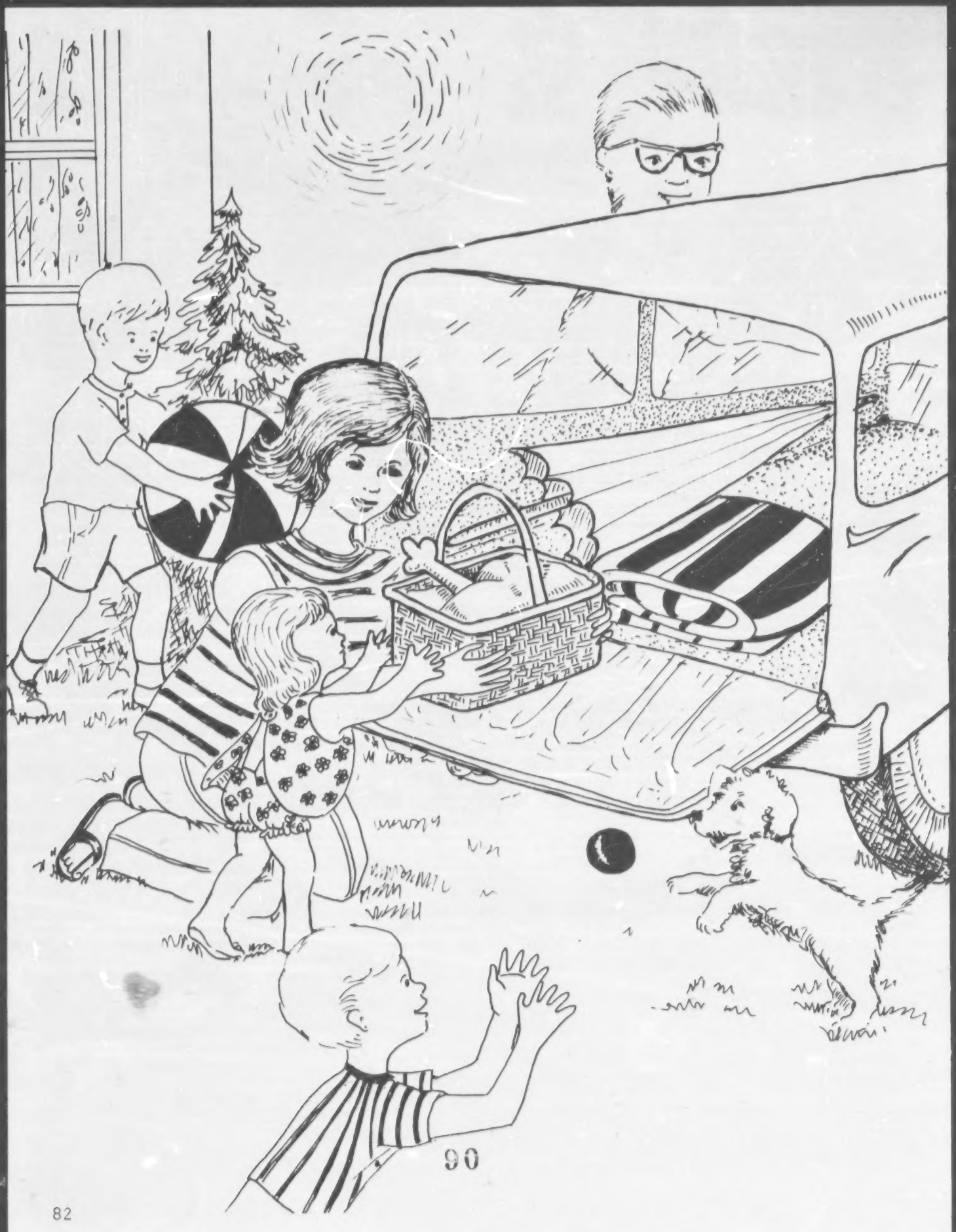
Enrich the children's perception of weather by introducing some of the delightful poems in poetry anthologies. (Consult the Reading List, page 110.) You might encourage the children to make up poems or to help you make up poems — each suggesting a line. Here is one you may use as an example if the children have difficulty:

I'm watching the clouds
So high in the sky —
Piled so high
Piled so high.

I'm wondering why
The blue of the sky
Has gone away.
I'm wondering why
It's gray today.

picnic at the beach





One morning Linda skipped into the kitchen. "Father," she said, "this is a good picnic day. The sky is all blue and the sun is bright. May we go to the beach?"

"Are you sure it won't rain?"

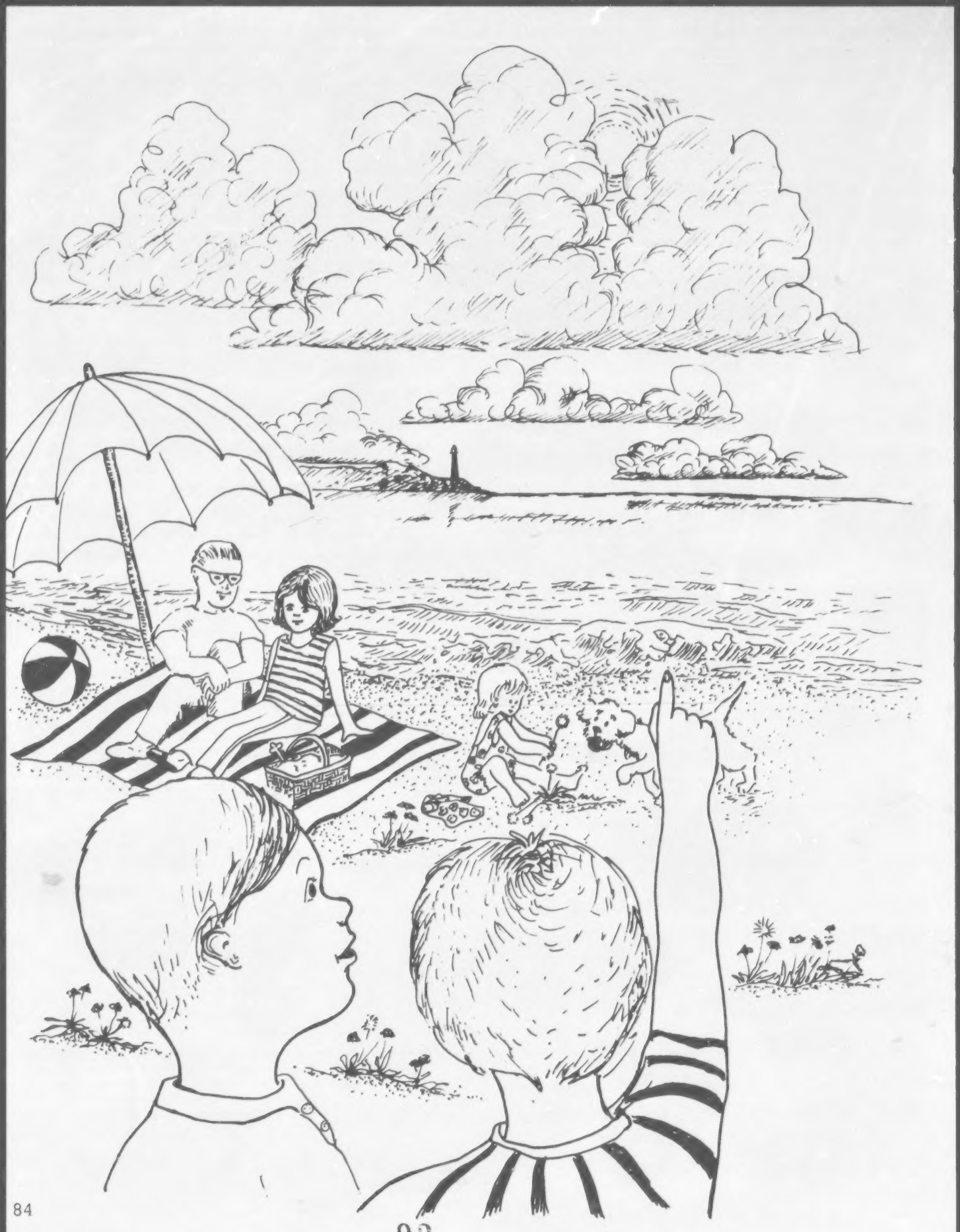
Jimmy jumped up from his chair and ran to the window. "There isn't a cloud in the sky, not even one. I don't think it will rain."

"I'll make a picnic lunch right away," said Mother.

"May we invite Tommy and his dog, Dibber?" asked Jimmy.

"All right," said Father, "if Dibber will sit on someone's lap."

Linda helped Mother pack the picnic basket. Tommy brought along a bone for Dibber. Mother put it in the picnic



basket on top. When Father saw it sticking out of the picnic basket, he said, "Mmm, yum, bones for lunch. My favorite food."

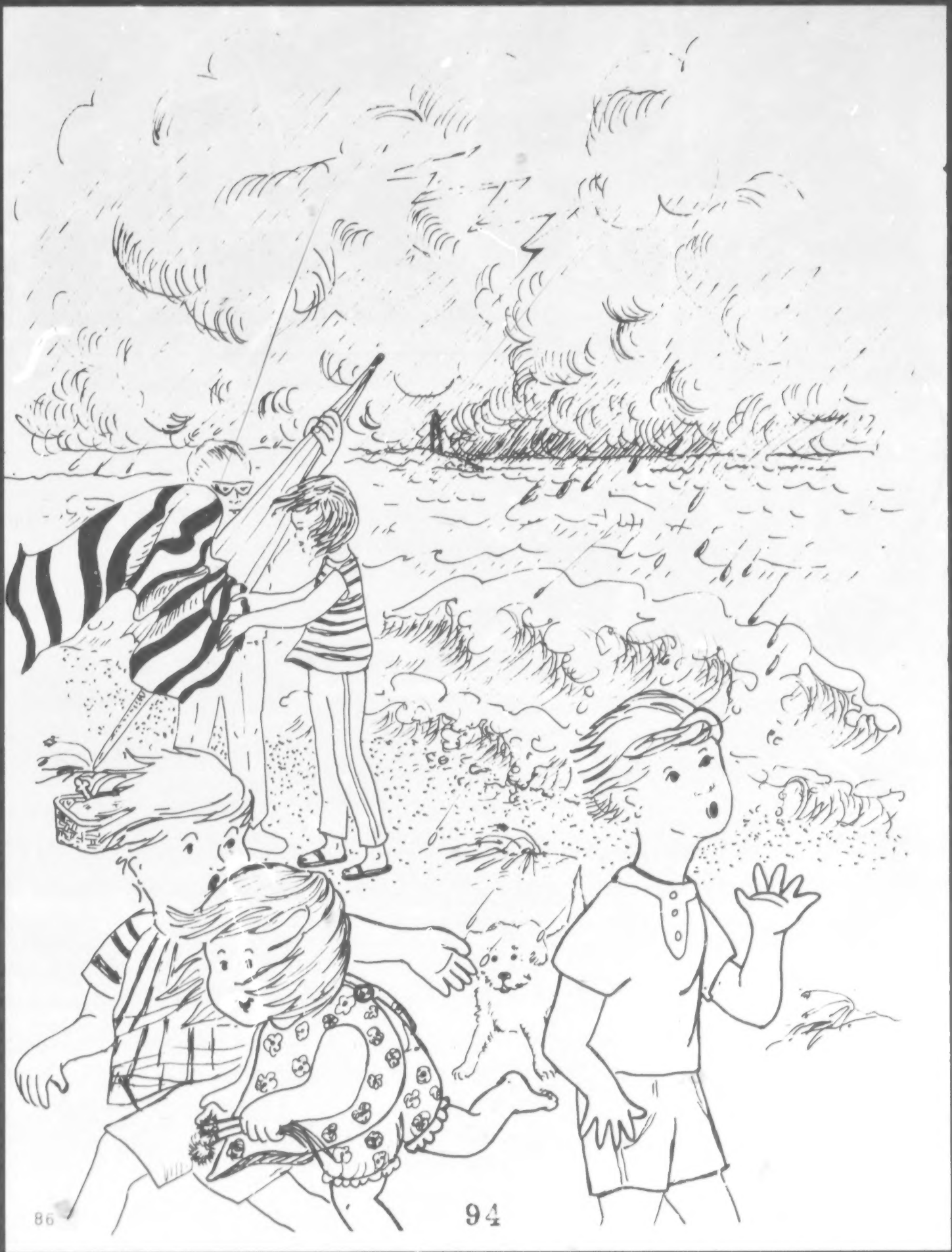
Mother said, "Father, you will have to grow a tail and learn to bark before you can eat bones for lunch." Then Mother and Father and the children got into the car and rode to the beach.

When they came to the beach, Dibber jumped out first and ran about sniffing all the new smells. Mother and Father spread out a blanket to sit on. Linda went to pick dandelions.

"Let's play ball," Jimmy said to Tommy. He took out a red ball from the trunk of the car. The boys did most of the throwing, but Dibber did most of the catching. One time Jimmy threw the ball up as high as he could. He looked up, and he noticed some very little clouds far away in the sky. "I wonder where those little clouds came from," he said. "I didn't see any this morning."

"What I wonder," said Tommy, "is when lunch will be ready." He looked to see if Jimmy's mother was unpacking the picnic basket yet. She was still sitting and talking with Father.

All the time, Jimmy was watching the little clouds. They were moving slowly in the sky, coming close to where Jimmy and Tommy were. When Dibber came back with the ball, Jimmy said, "That cloud looks like you, Dibber." Dibber barked an answer.



Jimmy lay down on his back to get a better look at the clouds. Tommy and Dibber lay down too. Some big clouds were moving together behind the small ones. Soon the big clouds were over the boys' heads. The boys felt a breeze blowing over them as they lay on the warm sand.

"I see an elephant," shouted Jimmy. He pointed to a huge cloud. "It has a long trunk and four feet!"

"There's my house," Tommy pointed to another cloud. "See the roof and the window."

"It looks more like a sailboat to me," said Jimmy. "Your roof is my sail."

"Now it doesn't look like a house or a sailboat. It is more like a lettuce leaf, only not green. It's changing all the time."

Linda came over to look at clouds too. She put her dandelions down. "I wish I could roll in those clouds," she said. "They look so soft."

More and more clouds came. They got bigger and bigger and they moved faster and faster. Soon the sky was filled with huge white clouds and some pink and yellow ones, too.

Jimmy shivered. "Brr." he said. "It's getting colder." He buttoned his sweater. When he looked up, all the white clouds were turning grey and dark blue. Suddenly, the beach grew dark as the clouds piled up so high they hid the sun.

Dibber started running around in circles. "What's the matter with Dibber, Tommy?" Jimmy asked.

"He's scared." Tommy petted and scratched Dibber to make him feel better.

The wind blew harder. It lifted up Linda's dandelions and spread them all around. Then the children heard a boom in the distance. Next time the thunder was nearer, and louder. A flash of lightening zigzagged across the sky.

"Come on," Jimmy told the others, "let's run for the car. It's going to rain." Linda grabbed a few dandelions and they all ran.

When Mother and Father saw the children coming, they started for the car too, with the picnic basket and blanket.

They piled into the car as the first raindrops fell. "Where's Dibber?" They all looked back where they had come from.

They saw a little speck that got bigger and bigger and finally was Dibber with a ball in his mouth. "Good old Dibber," said Jimmy as Dibber jumped into the car. "You remembered the ball. You're a good dog to take on a picnic!"

Tommy helped himself to a delicious peanut butter sandwich. He looked at the big pieces of chocolate cake and smacked his lips.

"It's almost as much fun eating our picnic lunch in the car as eating it on the beach."

"Ho, ho! Who said it wouldn't rain?" Father said, but he was only teasing.

NIGHT AND DAY

PURPOSE

To have the child observe, report and speculate about the differing scenes of the day and night.

To alert the child to the daily rhythm of natural events.

COMMENTARY

Many of the child's activities are determined by the daily rhythm of day and night. He is undoubtedly aware of some of these events, but here he is encouraged to focus full attention on them. Your role, here again, is to help him become a conscious observer and questioner in the context of immediate experience. The result of the lesson should be an elementary understanding of the pattern of the daily rhythm and recognition of phenomena and activities which are peculiar to day or night. There are several definitions of "day". Here we define it as the period between sunrise and sunset.

MATERIALS

- poems about day and night, stars, the moon, shadows, etc.
- one or 2 sources of light: flashlight, lamp, or slide projector
- toys in shapes appealing to children for casting shadows
- peep show box, shoe box size, with lid
- heavy cardboard or beaverboard, 12" x 12"
- knitting needle or long nail for sun dial indicator

Activity 1

Nightwatching

Start a discussion with the children which will reveal what nightwatching they have done. By this age, many of them will have had an occasion to be out late and

to discover how different night is from day. Some of the wonder of that first experience can be recaptured in class as the children relate and compare what they remember. Point out differences in what is reported: The moon was round and full; the moon was a small sliver; it was white or orange; it had dark shadows. The stars came out all at once or little by little; the stars shone or twinkled; they were all the same or varied in brightness or color. Raise questions such as

WHAT COLOR WAS THE SKY?

WAS THE SKY COMPLETELY DARK?

WHAT HAVE YOU NOTICED ABOUT THE MOON?

WHY DOES IT GET DARK?

WHAT HAPPENS WHEN IT GETS LIGHT?

HOW CAN WE FIND OUT?

Promote interest in further observation in order to check what has been said in class. Suggest that the children become nightwatchers for a little while that evening in order to tell the class the next day. Before dismissal, remind the children of the assignment. You may wish to send a note home asking the parents to encourage observation in the evening, preferably outdoors.

On the following day, ask what was observed. Discuss and compare observations. Consider whether the observations are unique to the nighttime.

CAN WE SEE THE STARS IN THE DAYTIME? . . . . CAN WE SEE THE MOON? . . . . HOW DOES IT LOOK?

Ask about the habits of animals.

WHAT ANIMALS ARE AWAKE AT NIGHT? (mice, owls, cats) . . . . ARE BUSY AT SUNSET? (birds, bats, mosquitoes, fireflies) . . . . ARE BUSY EARLY IN THE MORNING? (birds)

Activity 2 — Daywatching

Ask the children to tell how day is different from night. Sun or light, will be mentioned. Ask

WHERE DOES THE DAYLIGHT COME FROM?

DOES THE SUN ALWAYS SEEM TO BE IN THE SAME PLACE IN THE SKY?

If you have a sunny room, have children note when window shades need to be pulled. Have them note which areas in the room are in sunlight at different times of the day and account for the shifting pattern.

WHAT DO YOU NOTICE WHEN YOU SIT IN SUNLIGHT? (heat, light)

WHAT ANIMALS LIKE TO BE IN SUNLIGHT. . . .
WHAT PLANTS? . . . .HOW DO YOU KNOW?

At dismissal time, suggest the children observe the position of the sun when they go out, in the evening before dinner, and again the first thing in the morning. The next day call for their observations.

You may wish to take up day and night watching on several occasions so that the children become aware of monthly and seasonal changes (for example, the phase of the moon and the duration of daylight at different seasons).

Activity 3 — Shadows

Outdoor activity. Take the children out to the playground on a sunny day. Have them stand in some order so that their shadows fall in front of them. If no child says "There is my shadow," ask them what they see. Encourage them to experiment with shadows. At appropriate moments, ask questions such as:

WHERE IS YOUR SHADOW?

IS IT ALWAYS IN FRONT (IN BACK, AT YOUR SIDE)? . . . .ATTACHED TO YOU?

HOW IS YOUR SHADOW DIFFERENT FROM YOU?

CAN YOU MAKE YOUR SHADOW DISAPPEAR?

DO OTHER THINGS HAVE SHADOWS?

ARE SOME SHADOWS USEFUL? (trees, umbrellas, awnings)

If there is an area on the schoolyard which no one uses, draw the outline of a child on the sidewalk or on a piece of wrapping paper taped to the ground. Return some time later in the day and have the child stand in the same position. Have children speculate about the change in the shadow outline.

These schoolyard activities may be repeated on a cloudy day or on one of alternate sun and clouds. Finally, the observations and questioning may lead to the realization that the sun makes shadows when its beams are intercepted. Robert Louis Stevenson's poem "My Shadow" is interesting to read in this context.

Indoor activity. The next step is to wonder if a shadow can be made inside a building or when the sun is not shining. Use practical suggestions made by the children. Have available one or two sources of light from the materials list to carry out the ideas of the children. Allow the children to experiment with the lights in as many ways as they wish. Have them make discoveries by holding the light at various heights, beaming it on (or away from) various objects. Provide toys of interesting shapes, such as figures from a farm set, small dolls or blocks, for casting shadows. Let the children decide which to use in their tests. They may also discover that fingers can be used to create interesting shadows.

Activity 4 Elementary Sun Dial

For this activity, you need a window sill on the sunny side of the building. If your classroom does not have one, perhaps a window in the hallway will do. Take a light-colored piece of heavy cardboard or beaver-board (12-inch square) and stick a long nail, knitting needle or pencil upright at the center. Place it on the sunny window sill. At the beginning of the session, trace the shadow line with a pencil mark. Repeat when the class period is half over and again before dismissal. Have the children speculate about the change in direction of the shadow line.

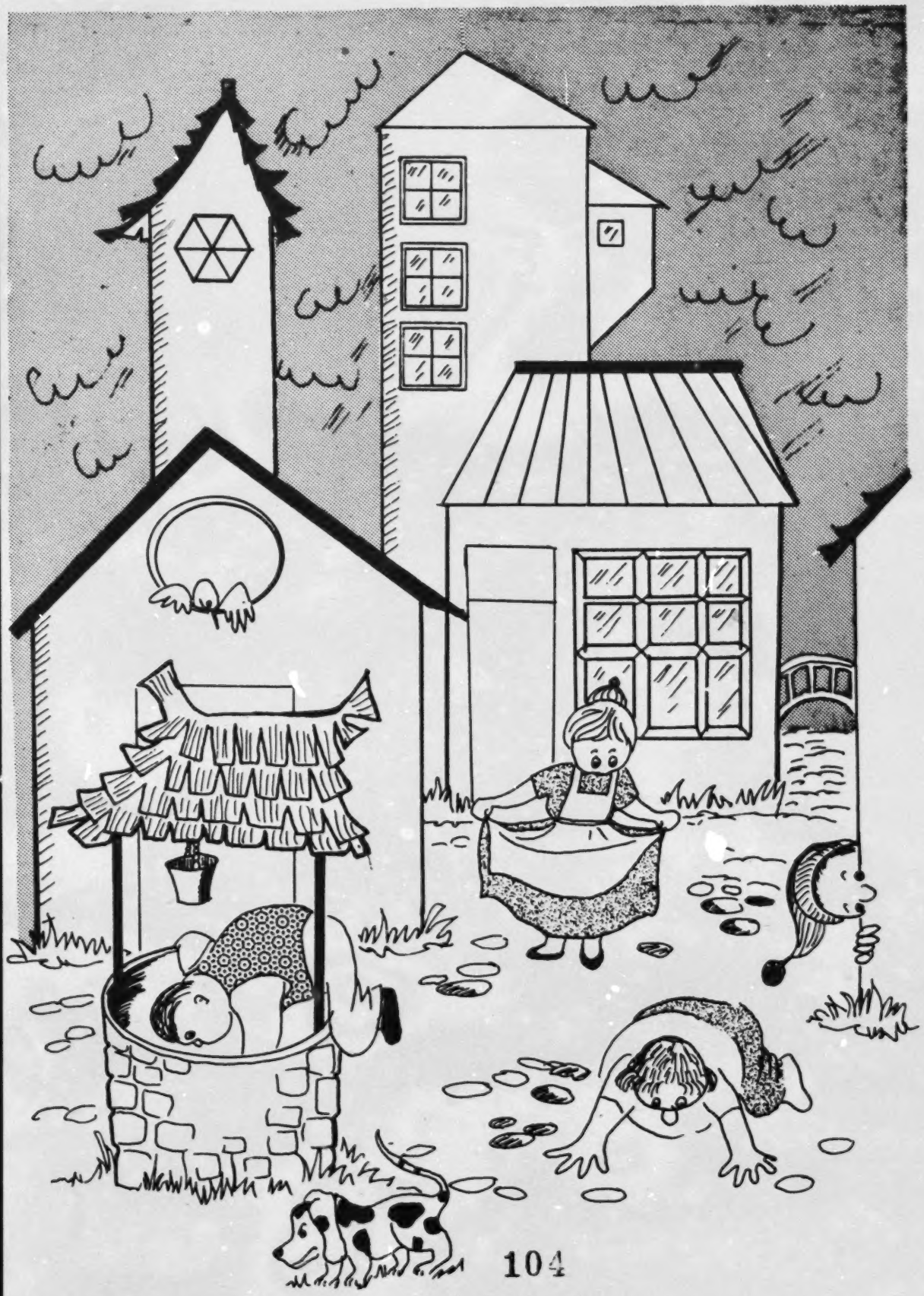
Activity 5 Day and Night in Poetry

Introduce poems about day and night, stars, the moon, shadows, and so on, asking the children to identify afterwards what the watcher, the poet, saw. Poems are found in anthologies on the Reading List, page 110. Here are two others for a start.

Night and day
Day and night.
One is dark,
One is bright.
Which is day?
Which is night?

Cats go prowling,
Children sleep;
Bats are flying,
Birds don't peep.
Some choose days,
Some nights
To sleep.

THE LOST SHADOWS OF TWITTERVILLE



104

It was a sad day in Twitterville. All the people in the town ran around, waving their hands in the air, and shouting. No one knew what to do! (The most serious of all problems had come upon the tiny town of Twitterville.) Something terrible had happened. Everyone had LOST his shadow!

Believe it or not, there wasn't one shadow to be found in all of Twitterville. The houses had no shadows. The trees had no shadows. The dogs and cats had no shadows All the people of Twitterville were shadowless.

Who would believe that Twitterville had no shadows? Why, everything in the world has a shadow.

The people of Twitterville called a meeting. Everyone met in a large building at the end of town. Fathers and mothers came with their children. Dogs came with their old soup bones. Even pussycats came with their catnip-filled stockings. It was to be the most important meeting that the people of Twitterville ever held -- for they just had to decide how to get back their shadows.

Cornelius Crump brought the town meeting to order.

"ORDER!" he shouted out like an old fog horn.

Everyone was quiet.

"We will listen to Henry Stodgy," Cornelius said.

Then a plump man stepped up on the stage and announced in a squeaky voice:

"People of Twitterville ... I have solved our problem. I have asked the Great Smartie of Potsville to come to our town. He knows of a way to return our shadows to us. He knows everything, according to the people in Potsville. He will be here tomorrow."

BAKE

Then a woman named Phinny Phoo said, "But Henry, when is tomorrow? How can we tell? The sun hasn't shone for days now. It has been cloudy for a long time."

"Keep quiet!" Cornelius said to Phinny Phoo. "Our Henry knows what he is doing. The Great Smartie will solve our problem."

After a few hours and minutes and seconds, the Great Smartie of Potsville arrived in Twitterville carrying a huge sack over his back

He dumped the contents of his bundle into a large pile in the center of town. Then he danced through the streets of Twitterville and sewed great, big, black, cloth shapes on the bottoms of the shoes of all the people and on the bottoms of the paws of all the animals. Everyone looked at the ugly black cloth shapes dangling from the soles of their shoes.

"Ugly!" Pepper Corn said.

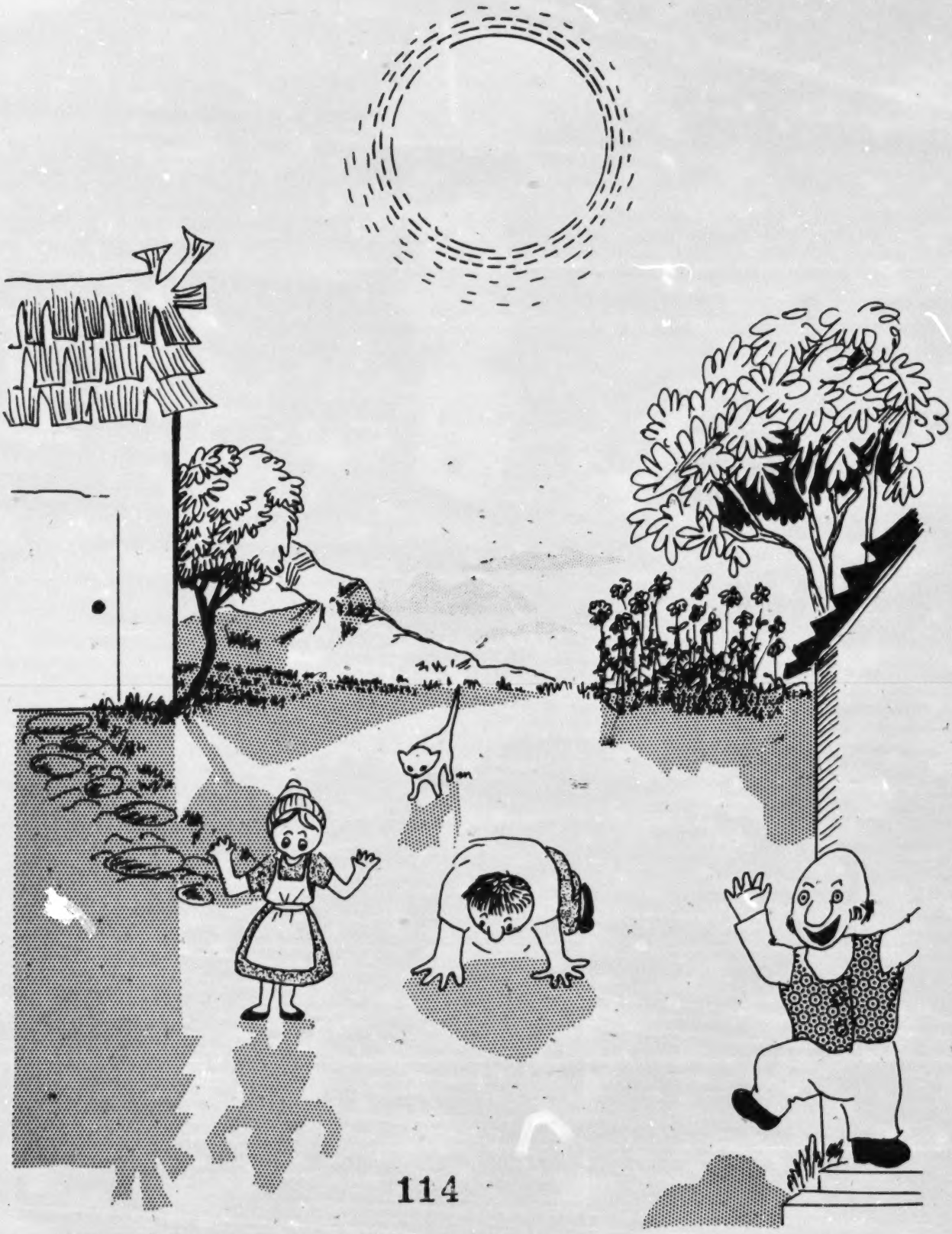
"Clumsy!" Jelly Jar Gerry said.

The cloth shapes lay in crumples on the ground. When the people tried to walk, they stumbled and became all tangled and knotted up in the shapes.

"This is a stupid idea!" Phinny Phoo said. "These are not shadows. These are just old pieces of cloth sewed onto our feet. We need our real shadows returned to us. We need a shadow that moves when we move, reaches when we reach, and jumps when we jump. We need a shadow that plays hide-and-seek when we run into larger shadows. We need a good black, flat, shadow that lies quietly on the ground and moves only when we move.

Phinny Phoo was really angry. She stomped as she went to see Henry Stodgy. The Great Smartie heard Phinny Phoo yelling. He knew she didn't like his idea of sewing on black cloth shapes for shadows. So he left Twitterville quietly by way of the back gate.

When Phinny Phoo arrived at Henry's office, she found him just about in tears. He knew the Great Smartie had failed in his job of returning the shadows to Twitterville. Phinny Phoo felt sorry for Henry. She told him not to worry. She was sure something would happen to bring the shadows back to Twitterville.



114

AND SOMETHING DID HAPPEN! Suddenly all the shadows in town returned to their rightful places. The horses had shadows. The houses had shadows. The dogs and cats had shadows. Everyone in Twitterville had his shadow back!

Phinny Phoo and Henry peeked outside when they heard all the shouting from the people. They saw all the shadows - big, black, and lying flat like pancakes - in their rightful places.

"What brought back the shadows?" Henry asked Phinny Phoo.

Phinny Phoo just smiled and looked up at the bright sunny sky.

Do <u>you</u> know what brought the shadows back to Twitterville?

READING LIST

For Children

Adelson, Leone	All Ready For Winter	McKay 1952
Adelson, Leone	All Ready For Summer	McKay 1956
Adelson, Leone	Please Pass The Grass	McKay 1960
Anglund, Joan Walsh	Look Out The Window	Harcourt 1959
Bannon, Laura	Little People of the Night	Houghton 1963
Bendick, Jeanne	All Around You	McGraw 1951
Brown, Margaret Wise	A Child's Good Morning	Wm. R. Scott 1952
Buckley, Helen E.	Josie and the Snow	Lothrop 1964
Bulla, Clyde	What Makes a Shadow	Crowell 1962
Burton, Virginia L.	Katy and the Big Snow	Houghton 1943
Clark, Ann Nolan	Tia Maria's Garden	Viking 1962
Collier, Ethel	Who Goes There in My Garden	W. R. Scott 1963
Conklin, Gladys P.	If I Were a Bird	Holiday House 1965
Conklin, Gladys P.	We Like Bugs	Holiday House 1962
Fisher, Aileen L.	I Like Weather	Crowell 1963
Fisher, Aileen L.	In the Middle of the Night	Crowell 1965
Garelick, May	Where Does The Butterfly Go When It Rains	W. R. Scott 1961
Gay, Zhenya	Nicest Time of Year	Viking 1960
Goudey, Alice E.	Day We Saw The Sun Come Up	Scribner 1961
Holl, Adelaide and Duvoisin, R.	The Rain Puddle	Lothrop 1965
Huntington, Harriet	Let's Go Outdoors	Doubleday 1939
Keats, Ezra Jack	The Snowy Day	Viking 1962
Kessler, Ethel and Leonard	Day Daddy Stayed Home	Doubleday 1959
Krauss, Ruth	The Growing Story	Harper 1947
Kumin, Maxine W.	Beach Before Breakfast	Putnam 1963
Lenski, Lois	Now It's Fall	Walck 1948
Lenski, Lois	I Like Winter	Walck 1950
Petersham, Maud and Miska	Box With the Red Wheels	MacMillan 1961

Selsam, Millicent	Seeds and More Seeds	Harper 1959
Selsam, Millicent	How Animals Sleep	Scholastic Book Service
Showers, Paul	In The Night	Crowell 1961
Sterling, Dorothy	Caterpillars	Doubleday 1961
Tresselt, Alvin	Autumn Harvest	Lothrop 1951
Tresselt, Alvin	Follow the Wind	Lothrop 1950
Tresselt, Alvin	Hide and Seek Fog	Lothrop 1965
Tresselt, Alvin	Hi! Mister Robin	Lothrop 1950
Tresselt, Alvin	Johnny Maple Leaf	Lothrop 1948
Tresselt, Alvin	Raindrop Splash	Lothrop 1946
Tresselt, Alvin	Sun - Up	Lothrop 1949
Watson, Jane Werner	Wonders of Nature	Golden Press 1958
Zolotow, Charlotte	Sleepy Book	Lothrop 1958

For Teacher

Arey, C. K.	Science Experiences for Elementary School	Bureau of Publications, Columbia University 1961
Blough, Glenn O. and Campbell, Marjorie H.	Making and Using Classroom Science Materials	Holt 1954
Carson, Rachel	The Sense of Wonder	Harper and Row 1965
Fisher, Aileen	In the Woods, In the Meadow, In the Sky	Scribner 1965
Golden Book of Nature Series	Insects	Simon and Schuster 1956
	Stars	Simon and Schuster 1956
	Weather	Simon and Schuster 1956
Parker, B. M.	Golden Book of Science	Golden Press 1963
Subarsky, Zachariah Reed, Elizabeth	Living Things in Field and Classroom	MINNEMAST University of Minn. 1967
Untermeyer, Louis	Golden Treasury of Poetry	Golden Press 1959
Werner, Jane	Golden Book of Poetry	Golden Press 1949

WONDERING

WHY

Children in the MINNEMAST program receive this booklet to take home and enjoy with their families. The purpose of the booklet is to stimulate curiosity. It is hoped that you will encourage your child to ask questions similar to those here.

Wondering Why

Written and Illustrated by

Sonia D. Forseth

© 1967, University of Minnesota. All rights reserved.

You can wonder and wonder, and never stop wondering.

Have you ever stopped to look at something
you never saw before?
Did you wonder what it was?

Did you ever wonder what ants are doing and why they are doing it?

Did you ever wonder about a bug?

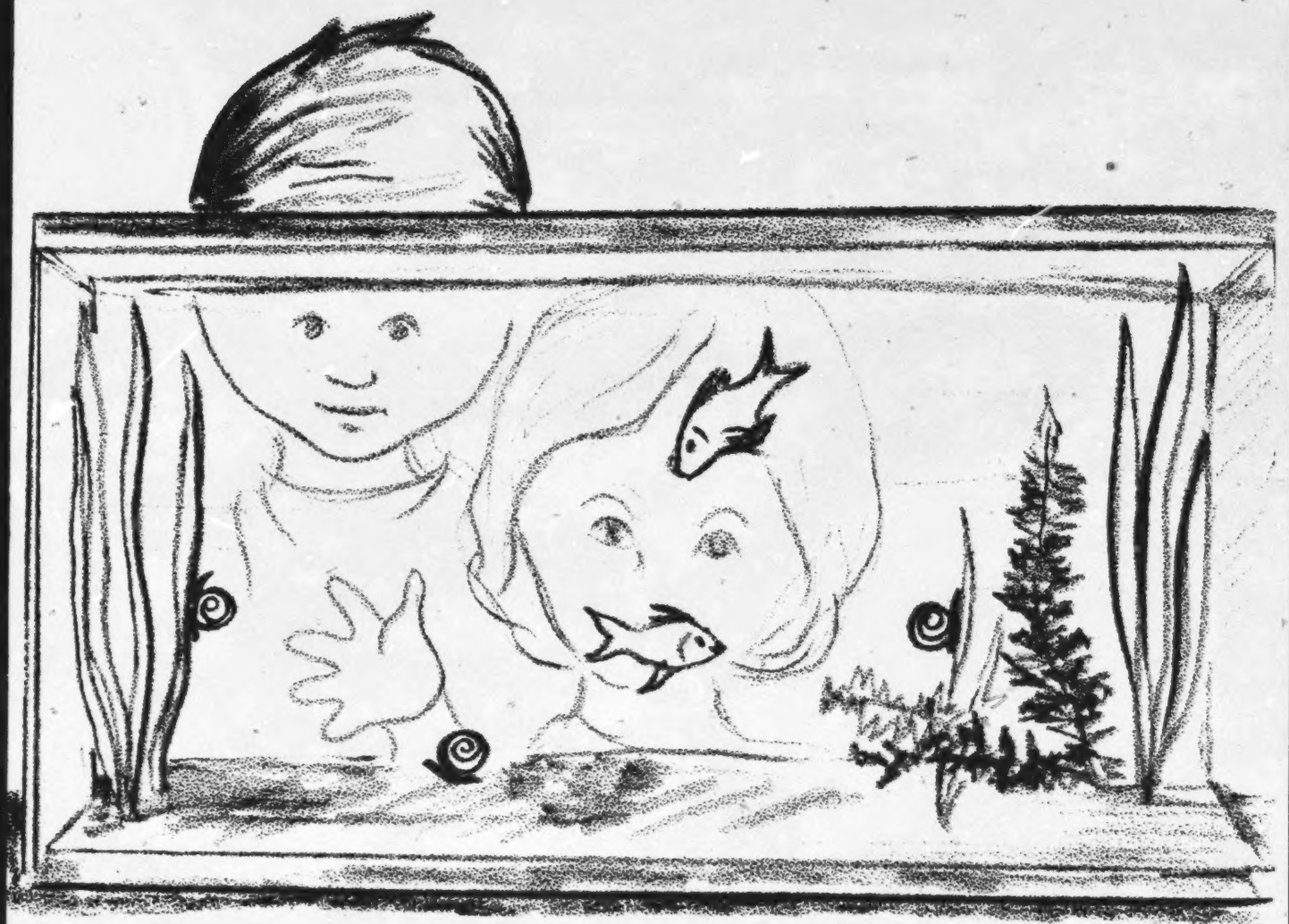
What do you think will happen when the child touches this one?

122

Do you know where insects live?

Did you ever watch a snail?

How does it move?

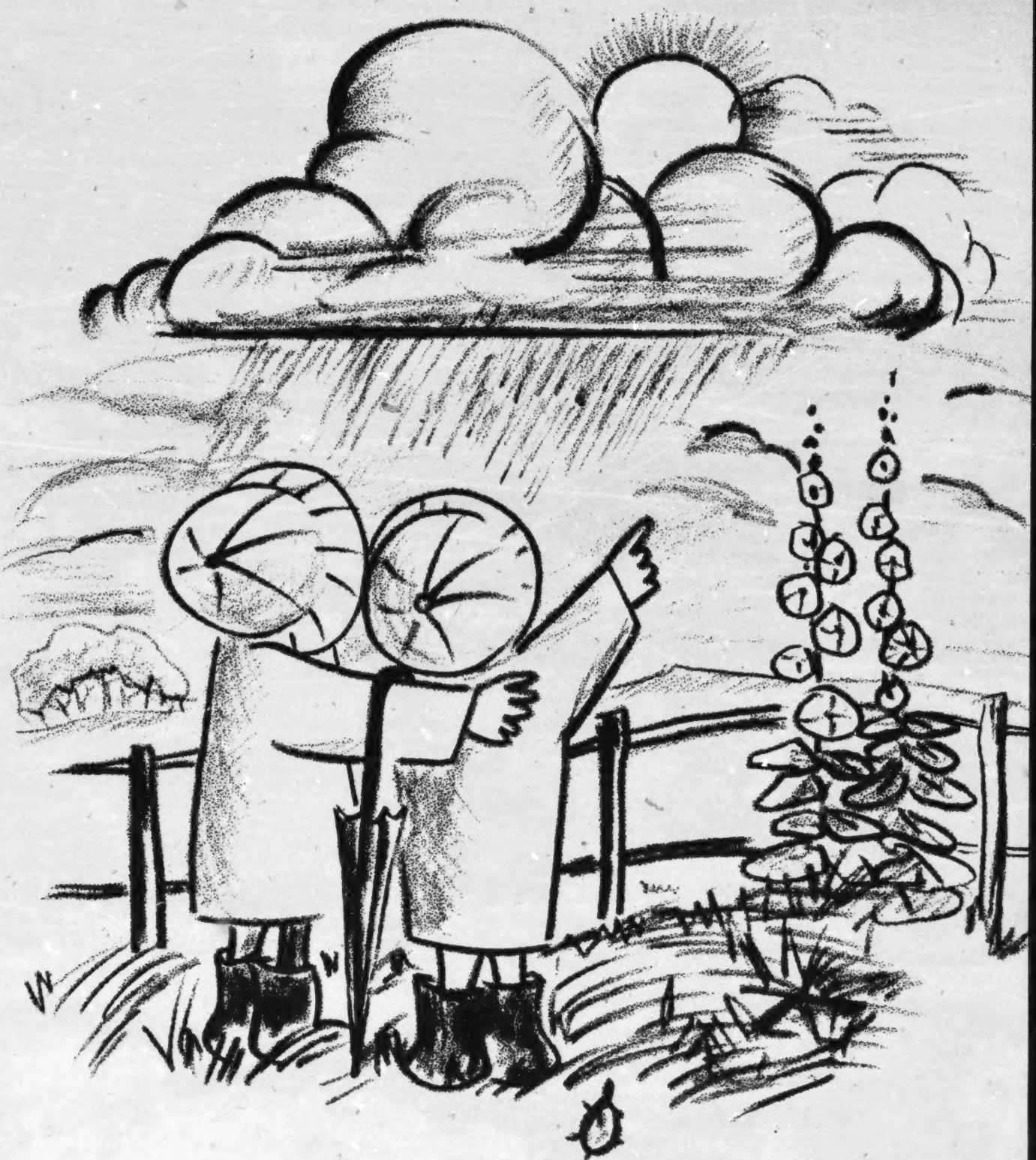


Did you ever wonder what it would be like to live inside a shell?

Did you ever wonder what a cloud is made of?

What do you suppose the rain sounds like on the children's umbrella?

Did you wonder what happened to the rain after it fell to the ground? Where did it go? ..

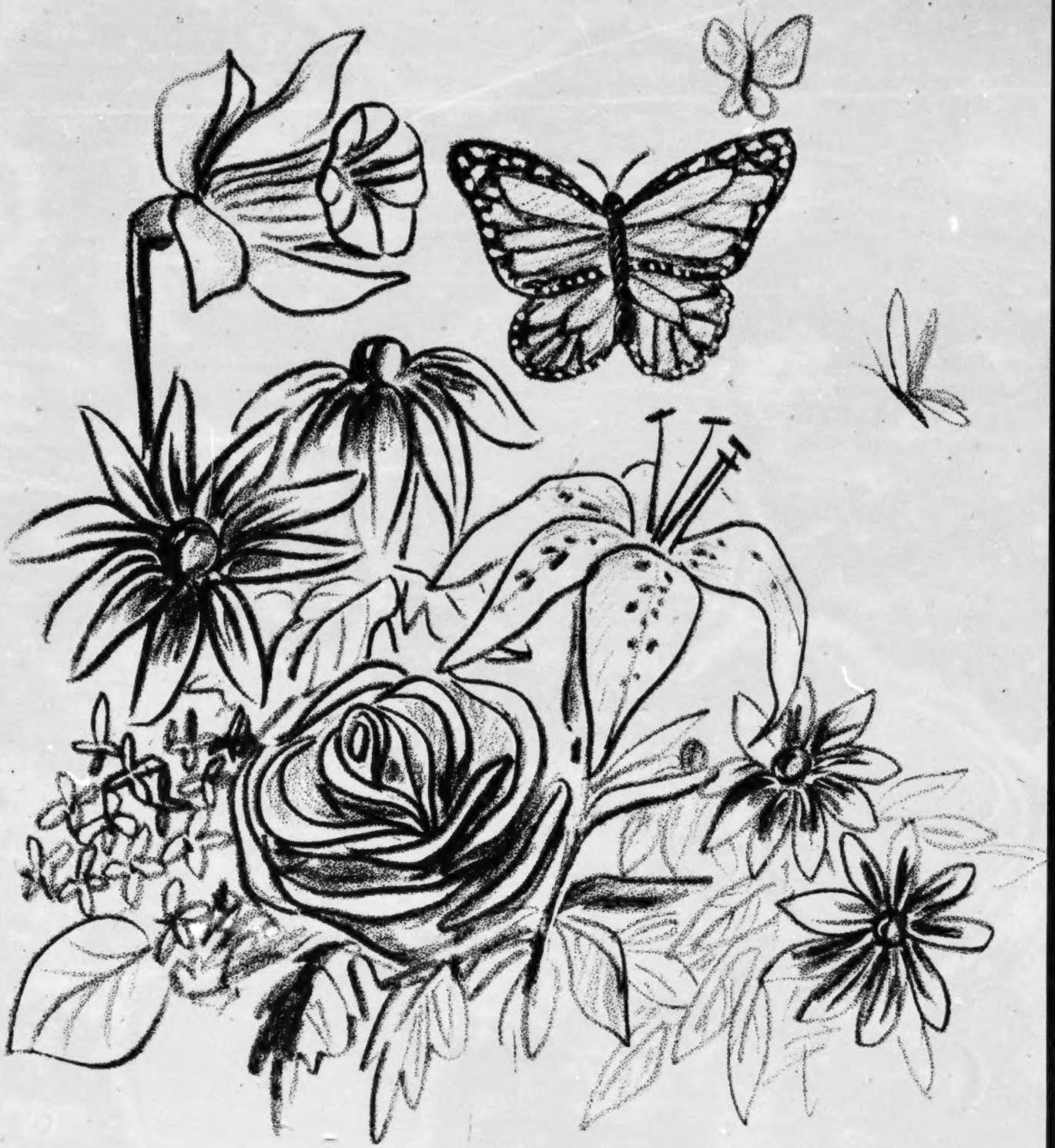


Did you ever wonder where the sun is when it is raining?

Can you lose your shadow?

How do you suppose icicles grow?

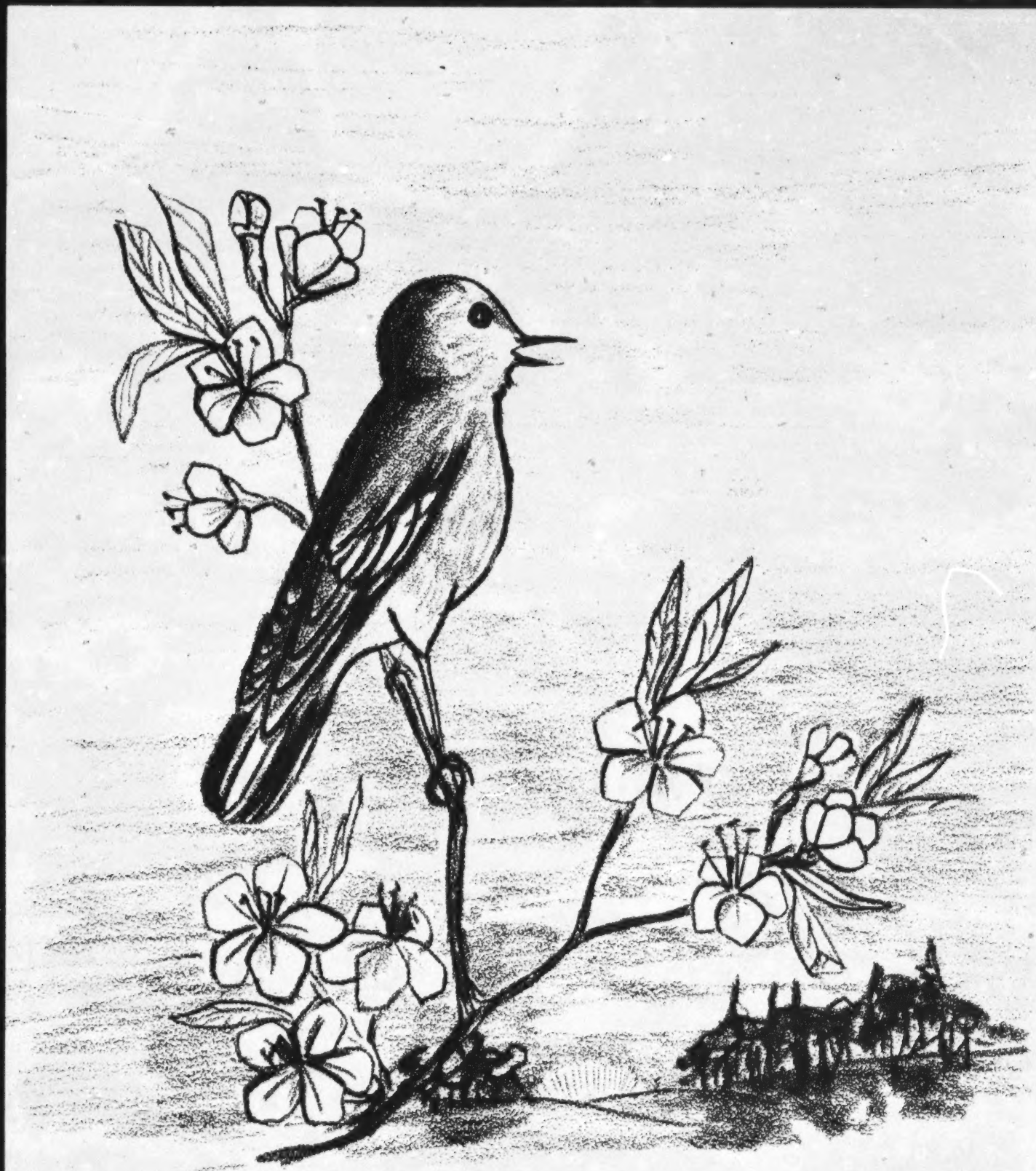
What is inside the earth?



Where do you suppose butterflies come from?

132

What can you tell about the night?



Do birds go to sleep at night?

Why is the little girl watching the spider?

135

If you haven't begun to wonder about these things, why haven't you?

136